

HIGHER EDUCATION: HANDBOOK OF THEORY AND RESEARCH

Volume XXIII

Edited by

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University of Memphis

Higher Education: Handbook of Theory and Research

Volume XXIII

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Higher Education: Handbook of Theory and Research

Volume XXIII

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Economic Models and Policy Analysis in Higher Education: A Diagrammatic Exposition*

Michael B. Paulsen and Robert K. Toutkoushian

Introduction

Policy analysis is a term that is used very often in education circles and seems to have multiple meanings depending on the background of the person using the phrase and the context in which it is used. Generally speaking, a *policy* is “a definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions” (Merriam-Webster Dictionary, 2007), and an *educational policy* is “a specification of principles and actions, related to educational issues, which are followed or which should be followed and which are designed to bring about desired goals” (Trowler, 2003, p. 95). Who are the policy makers in higher education? For the postsecondary setting, policy makers would include entities and individuals who enact these laws and rules, including academic departments, colleges, institutions, and local, state, and national governments. The goal of educational policies is to lead to desired changes in behavior for participants within the education system. For example, a state-level educational policy may be implemented to help increase the percentage of high school students who go on to pursue a postsecondary education. The goal of this policy is to change the behavior of some high school students who may not be likely to attend college following graduation. As another example, an academic department may design policies to increase the quality of instruction given to undergraduate students. Here, the policy maker (academic department administration) is seeking to alter the actions of faculty in such a way that will lead to gains in instructional quality.

Educational policy analysis focuses on how one should evaluate the effectiveness of alternative educational policies when choosing between them. The analysis of policy in higher education—an interdisciplinary field of study—is richly

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informed by a diverse set of disciplines including sociology, psychology, political science, history, philosophy and more. One other discipline that has great potential to help us understand the higher education enterprise and to productively inform policy analysis in higher education is *economics*. Non-economists often associate economics with money, profit and other business-related phenomena and often equate economics with professional fields such as business, accounting or finance. Unfortunately, this perspective greatly limits and substantially narrows the view of many non-economists regarding the usefulness of economics for policy analysis in higher education. In terms of both structure and methodology, the discipline of economics is a social and behavioral science and has much more in common with sociology, psychology and political science than with accounting, finance and business fields (Paulsen & Toutkoushian, 2006b; Toutkoushian & Paulsen, 2006).

Economics is comprised of highly generalizable frameworks that are designed to analyze how *incentives* affect the *behavior* of decision makers who are in pursuit of goals. Most higher education policies represent elements of incentive structures—or changes in those incentive structures—that influence the behavior of individuals or institutions. For example, a state need-based grant to a student who is undecided about whether or not to pursue higher education changes the incentive structure this student faces by expanding the student's income *constraint*. For many students, this change in their income constraint will affect their decision-making and change their college-going behavior. This is very important for policy analysis in higher education because there are countless higher education policies that can be readily conceptualized in terms of tangible or intangible elements of incentive structures, and economics provides productive analytical frameworks for understanding, evaluating, and measuring the effectiveness of such policies.

Economists have a unique approach to looking at educational policy issues. They begin by identifying the decision makers for a given problem, the constraints those decision makers face, and the goals and objectives they want to pursue. This information, together with a series of behavioral and simplifying assumptions, is used to develop a conceptual model of the underlying process being studied. Economists then use the model to determine the allocation of resources that lead to the maximization of the goal given the constraints faced by the policy maker. More importantly, the model can shed light on how changes in one or more facets of the problem can affect this point of maximization. This is generally referred to by economists as comparative statics. Comparative statics prove to be very useful for educational policy analysis because they allow the economist to predict how policies might affect the outcome of interest. To economists, the analysis of educational policies is crucial because of the numerous policies that might be enacted to address specific issues, and the limited resources that policy makers have at their disposal to do this. Choosing an ineffective or less effective policy leads to an opportunity cost in that another action could have been taken that would have been more effective at reaching the intended goal.

In this chapter, we seek to provide the reader with a detailed explanation and one substantial illustration of how economists approach educational policy analysis, and how this can be useful for understanding and improving higher education. Our

presentation is primarily intended for those higher education scholars, administrators and practitioners who are not trained in economists. Toward this end, we have minimized our use of mathematical notation and maximized our use of diagrammatic representations of all economic models, with each diagram and model accompanied by substantial and detailed narrative explanation. In the first half of this chapter, we focus on explaining how economists develop and use models in their work, and how economists use these models to examine educational policies. In the second half of this chapter, we explore the use of human capital theory—the theoretical framework from economics that is the most widely-used for the analysis of higher education policies—and a model of the market for investment in higher education to provide a detailed illustration of how economic theories, models, and methods can be and have been applied to educational policies in the realm of student access to postsecondary education. We conclude with a discussion of some of the measurement issues encountered when trying to analyze educational policies and factors such as data limitations and self selection that impose limitations on what can be done to analyze the effectiveness of alternative educational policies.

General Economic Approach to Educational Policy

In this first section, we focus on providing the reader with a general description of the approach that economists use to examine educational policies. This approach can be applied to many different problems within higher education, including student access to higher education, faculty compensation and time allocation, student retention, and educational productivity, to name but a few. We encourage those readers interested in more detailed and in-depth explanations of the general microeconomic concepts, models and methods presented in this chapter to consult some of the fine microeconomic textbooks available at the introductory level—such as Mankiw (2007) or McEachern (2006)—or intermediate-level—such as Pindyck and Rubinfeld (2005) or Frank (2003). Additional explanations of many of these concepts that are directed towards institutional researchers can be found in Toutkoushian and Paulsen (2006).

Economic Models

Economists rely heavily on the use of theoretical models to conduct their work in educational policy. A model by definition is meant to be a simplified depiction of reality, so that one can focus on a few important factors rather than all of the complexities of a given problem. An education model begins by identifying the decision maker of interest (such as a student, faculty member, or administrator), the goal or objective that they are trying to attain, and the constraints that they face in doing so. For example, a model that looks at whether or not students go on to college would

begin by identifying students (and perhaps their families) as the decision maker. The presumed goal of students is to make decisions that will maximize their happiness, or utility. Students face constraints, however, in that they only have limited financial resources to be able to pay for college and limited time to allocate among competing uses of their time. The economic model would be designed to describe in a relatively simple fashion how students allocate their time and income so as to maximize their utility, and what the implications would be for whether or not they choose to go to college. Essentially, a student would opt to go to college if doing so allowed him/her to obtain more lifetime utility than would be true by not going to college.

A typical model might posit that a decision maker such as a student receives utility from different combinations of two goods or services. The utility that individuals receive from these goods and services can and does vary across individuals. This means, for example, that two high school students could receive different amounts of satisfaction from going to college and using their remaining money for other goods and services. The utility from different combinations of goods/services is usually represented graphically in the form of an indifference curve. An indifference curve shows all of the combinations of two goods and services that would give a decision maker the same level of utility, making them “indifferent” between the choices. This is illustrated graphically in Fig. 1, where each indifference curve shows the combinations of two goods (labeled X and Y) that yield the same satisfaction level. Each decision maker is presumed to have an infinite number of such curves, with greater combinations of X and Y yielding more utility. The decision maker would prefer to reach the highest indifference curve possible because in doing so they will have increased their satisfaction.

While the indifference curves represent the goal that the decision maker is trying to achieve (in this case, maximizing utility), there are typically one or more constraints imposed on decision makers that limit the satisfaction they can attain. These are most often in the form of constraints on the amount of financial resources that can be spent, or the amount of time that can be used. A budget constraint is a way of graphically representing the choices available to a decision maker for allocating the resource in question. Figure 1 depicts a typical budget constraint, where the points of intersection on each axis indicate the maximum amount of a good or service that could be consumed if all of the financial resources were spent on that particular commodity. These points are derived by dividing the total financial resources of the decision maker by the price of each good. This also means that the position and slope of the budget line is fully determined by the decision maker’s level of financial resources and the prices of the two goods being measured. Any point along the budget constraint is viewed as an efficient use of resources because all of the resources are being expended for goods X and Y. Likewise, all points to the right of the budget constraint are unattainable given the current prices of the goods X and Y and available income.

The problem for the decision maker, from the point of view of an economist, becomes how to maximize their goal or objective given the constraints that they face. This can be seen graphically in Fig. 1. The optimal point, which is referred to

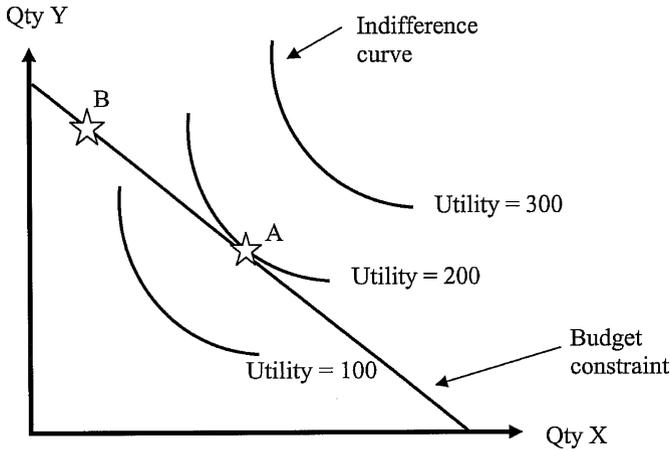


Fig. 1 Optimization

as the equilibrium, is found where the indifference curve is tangent to the budget line (point A). At this point, the decision maker is obtaining as much utility as possible given the level of resources and prices of the two goods or services. Any other point along the budget line, such as point B, would be efficient but result in a lower level of utility to the decision maker. Therefore, the decision maker could become happier by reallocating resources away from good Y and towards good X until point A is reached. While the decision maker would prefer to choose any combination along the indifference curve “utility = 300,” as noted earlier these combinations are unattainable with the current level of resources and prices.

Alternatives for Educational Policy

The economist’s view of educational policy analysis uses a theoretical model such as the one described above to ask the question: what policy can be enacted that would lead to a desired change in equilibrium? To illustrate, in 2004 62.5% of black non-Hispanic high school graduates and 68.8% of white non-Hispanic high school graduates entered college within 12 months of graduation (National Center for Education Statistics, 2005, Table 181). Policy makers may therefore be interested in understanding why this difference in the college going rates between students of different races has occurred and what might be done to help eliminate the gap. Figure 2 shows how these college-going rates might be expressed using the framework of indifference curves and budget constraints.

This framework also makes clear that the difference in college-going rates must be attributed to one or more of the following three explanations. The first is that white students have a higher preference than black students for education. Thus,

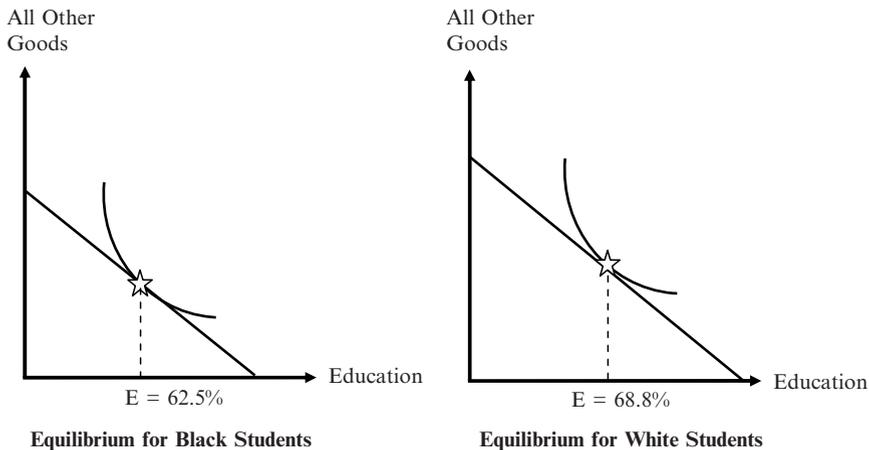


Fig. 2 Different equilibria by race

holding ability to pay constant, white students would be more willing than black students to trade other goods and services for education. If true, then the entire set of indifference curves for white students is shifted more towards education, leading to an equilibrium point that has more consumption of education. This is depicted graphically in Fig. 3. Only the indifference curves for each group that are tangent to the budget line are shown here. It is assumed here that both white and black students have the same exact budget lines, meaning that they have the same levels of financial resources for education and face the same prices for education. Accordingly, the gap in college-going rates is due exclusively to different preferences between the groups for higher education.

A second possible cause for the difference in college-going rates is that on average white students have more financial resources (income, wealth) than black students. As a result, the budget line for white students would be greater than (or to the right of) the budget line for black students, enabling white students to purchase more education and perhaps all other goods than black students. This is shown in Fig. 4. Note that it is assumed here that white and black students have the same indifference curves (i.e., they have the same preferences for education versus all other goods), and they face the same relative prices for education versus all other goods (i.e., their budget constraints are parallel). As a result, the different college-going rates are not due to different preferences for college, but rather different amounts of resources that could be used to pay for college.

Finally, a third potential explanation is that the relative price of education is lower for white students than it is for black students. This would enable white students to purchase more education than black students can purchase given their income. Graphically, this would cause the budget line for white students to pivot outward, and would lead to an equilibrium that contains more education for white students than for black students (Fig. 5). In this figure, we assume that white and

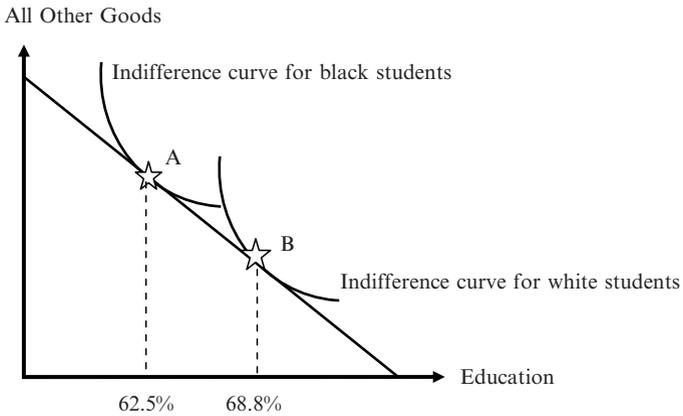


Fig. 3 Effects of different preferences for higher education

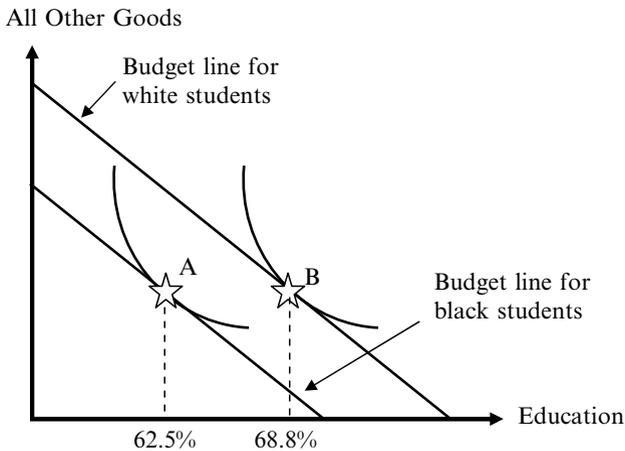


Fig. 4 Effects of different budget constraints for higher education

black students have the same indifference curves and the same amount of financial resources, and therefore the difference in college-going rates is fully attributable to the different prices that they face. Of course, it is also possible that any combination of these three explanations hold at the same time. For example, in comparison to black students, white students could have a higher preference for education and have more financial resources to acquire education.

The focus of economists who study educational policy is not so much with understanding the reasons why decision makers are at a given equilibrium point as it is with designing policies that would lead to desired changes in equilibria. The policy maker's action plan is intended to alter the behavior of decision makers in a particular way, regardless of the reason that the current equilibrium condition has emerged.

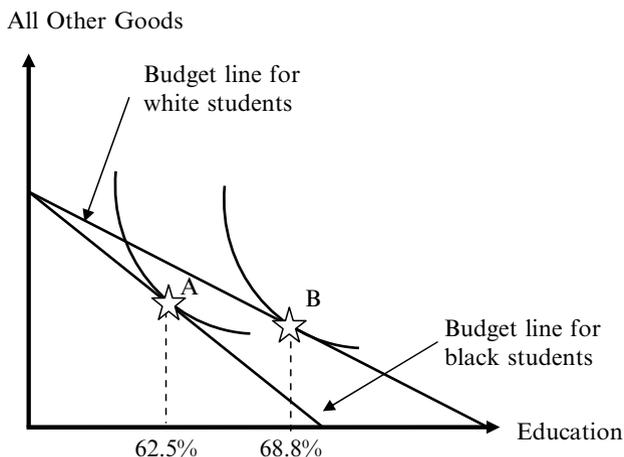


Fig. 5 Effects of different prices for higher education

The framework described here shows that there are three general ways in which an equilibrium can be altered: (1) change the preferences of the decision maker; (2) change the decision maker's level of financial resources; and/or (3) change the relative prices faced by the decision maker. As shown in Figs. 3 through 5, a policy that can accomplish any of these would lead to predicted changes in equilibria.

Returning to the previous example, the difference in college-going rates between white and black students could, in theory, be reduced by either shifting the preferences of black students more towards education, increasing the level of financial resources for black students, or reducing the price of education for black students. Policy makers might attempt to alter preferences by publicizing the advantages of going to college (or the disadvantages of not going to college), or introducing support programs at pre-collegiate levels that would make it more appealing for black students to want to pursue a postsecondary education. In fact, there are many examples of initiatives such as Project Opportunity (College Entrance Examination Board, 1971), the federal TRIO programs, and private initiatives such as I Have a Dream (Fenske et al., 1997) that could be viewed as attempts to shift the indifference curves of black students towards education.

However, among the three options for changing equilibria, economists usually focus their attention on educational policies that affect the constraints faced by decision makers rather than their preferences. Economists certainly acknowledge that changing preferences could change the equilibrium point, and that preferences of decision makers can and do shift over time. However, this approach is not often used by economists who are involved in educational policy analysis because the field of economics has relatively little to contribute to our understanding of how the preferences of decision makers are formed. This approach is best informed by the work

of the behavioral sciences, such as sociology, psychology, and others that provide insights into how students' preferences are formed.¹ Therefore, economic models typically take preferences as given and develop optimization models that are independent of how they are formed.

Educational policies that alter either the location or slope of the budget line can lead to the same changes in behavior without affecting the preferences of the decision maker. An economist knows with certainty that an income supplement to students will lead to an outward shift in the student's budget line, all else equal. Likewise, a policy such as increased state appropriations to institutions of higher education that reduces the tuition paid by a group of students would cause the budget line for these students to pivot outward. In each case, the policy maker has a high level of control over the magnitude of the change in the constraint that results from the policy. For this reason, these types of policies are often referred to as "policy levers." The identification of such policy levers, and the prediction, analysis, and evaluation of the effects of the use of policy levers constitute the most common applications of economic models to policy analysis.

The economic model of optimal decision making also shows that policies could be implemented that actually force decision makers to choose non-equilibrium positions along their budget constraint. Such policies might include minimum teaching and service loads for faculty, and compulsory attendance for students. In Fig. 6, for example, a student who was free to choose how to allocate her resources between education and all other goods would want to choose a point such as A. However, if policy makers sought to increase the amount of education that she obtained, they could implement a policy requiring students to attend college, increasing her educational attainment to point B. The problem with this policy, from the perspective of the student, is that it has led to a reduction in her utility or satisfaction. The fact that she faces a budget constraint means that the policy has forced her to forego some consumption that would have given her more enjoyment than did the additional education.

In contrast, the policies that alter the decision maker's budget constraint in some way still allow the decision maker the freedom to act as they see fit and to maximize their utility. To shift the budget line, an educational policy maker might advocate plans to provide income supplements to students and their families, or create tax advantages for the families of students that effectively increase their disposable income. The income supplement or tax advantage would cause the entire budget line to shift to the right, enabling students to purchase more education

¹This is true of traditional economics and economists. However, in the emerging field of behavioral economics, economists explicitly acknowledge and utilize the many natural connections between psychology—particularly cognitive and social psychology—and economic phenomena. Behavioral economists draw extensively on the social, cognitive, motivational, and emotional phenomena in their analysis of individual and group decision-making and in their examination of anomalies in the marketplace. For more information, interested readers should consult the volume by Camerer et al. (2003).

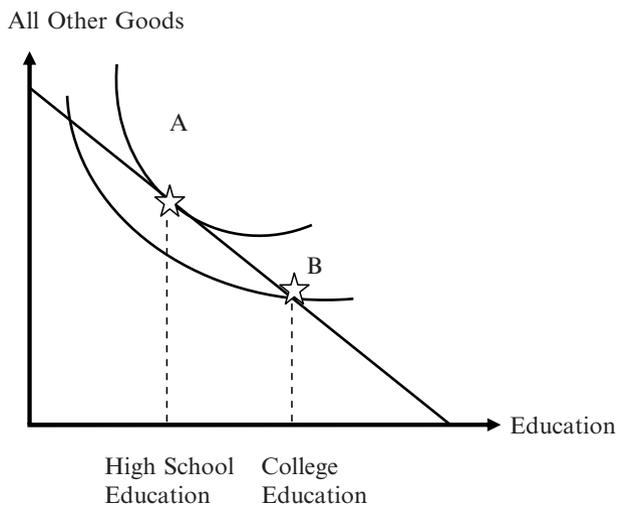


Fig. 6 Effects of choosing a non-equilibrium point

and all other goods. Finally, a policy could be implemented that would instead reduce the price of education. This may be achieved through an explicit price discount made by the institution or a commitment from the institution, state, or other entity to cover a percentage of all education completed by the student. Other examples of price decreases for students would include reductions in the interest rate charged on student loans, and the enactment of reciprocity agreements between states to charge in-state tuition rates to each other's residents.

Another means of affecting the constraints for decision makers is through what are known as in-kind subsidies. Generally speaking, an in-kind subsidy is a benefit that can be used for only a specific purpose. To illustrate, suppose that a state provided low-income students with a \$4,000 stipend that could only be used to pay for college. This is similar to a policy that would give low-income students an additional \$4,000 in income, except that the income supplement can only be used to purchase education. This would lead to a discontinuous shift in the budget line as shown in Fig. 7. The dashed line (C,A,B) now represents the budget constraint faced by the student. The student can consume up to \$4,000 in education without reducing the income available to consume all other goods and services, and therefore this segment of the budget constraint would be a horizontal line. After this point, however, additional dollars spent on education would reduce the amount of income left for purchasing other goods and services. Most forms of financial aid given to students would be characterized as in-kind subsidies because they cover a stipulated amount of the price of education as compared to a percentage discount per credit hour or year.

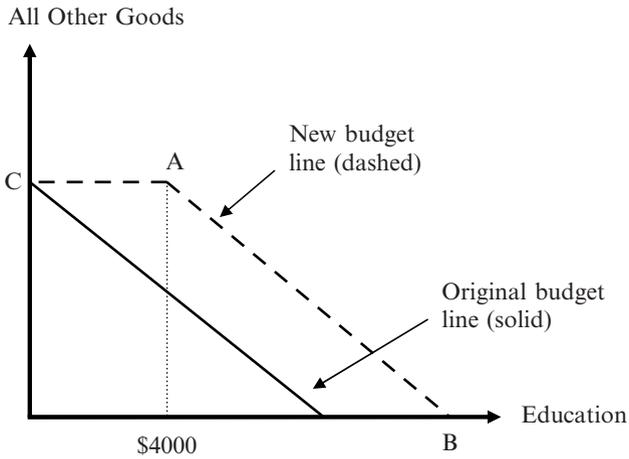


Fig. 7 Effects of \$4,000 in-kind subsidy for education

In-kind subsidies such as this may be preferred by some policy makers because the subsidy can only be used for the purpose intended by the donor. In contrast to an in-kind subsidy, a \$4,000 income subsidy could be used for many purposes aside from higher education, raising concerns that an income subsidy would be less likely to lead to a desired increase in college attendance. From the perspective of the decision maker, however, an in-kind subsidy is typically less favorable than an equivalent income subsidy. This arises because the possibility exists that a decision maker's new optimum point is along the horizontal segment (C,A), in which case the decision maker would have received more utility with an income subsidy of the same amount. Decision makers who would find new equilibrium points along the segment (A,B), however, are indifferent between receiving an in-kind versus an income subsidy because they would reach the same point regardless of the form of the policy. In this example, the student's family would have spent at least \$4,000 on education, and thus can use the subsidy to free up the same amount for spending on other goods and services. Accordingly, the in-kind subsidy functions as an income subsidy for them.

This general approach to policy—targeting action plans towards the constraints faced by decision makers—can be used in a wide range of higher education applications. There are many different decision makers within higher education, each with their own set of objectives and constraints. Academic departments, for example, can be viewed as decision makers because they must choose how to allocate limited faculty to meet its research, teaching, and service commitments. If university policy makers are concerned that faculty in a department are not spending enough time teaching undergraduate students, they may consider a range of action plans that could increase this quantity. The university might achieve this goal through increasing

the budget for an academic unit (a rightward shift in the budget line), thus enabling them to hire more faculty and use them to teach undergraduate students and carry out the other mission aspects of the department. An in-kind subsidy could also be provided to the department by providing them with funding to hire only faculty such as adjunct or clinical faculty who would specialize in teaching. Or the institution could focus on “price” by covering a percentage of the salary for only those faculty who specialize in teaching. All of these policies would be designed to affect the decision maker’s constraints in the hopes of changing behavior in a manner intended by the policy maker. These would differ from policies where the institution attempts to shift the department’s preferences towards instruction without altering the income or prices that they face.

Faculty members are another example of decision makers in higher education, in that they have some discretion over how they allocate their time between competing activities. In this instance, time and not income is the relevant constraint faced by the decision maker. In Fig. 8 we show an example of the constraint faced by a faculty member between allocating her time between teaching and research. For simplicity, we assume that the individual has a time constraint of 40 hours per week to allocate between these two activities. In equilibrium, she currently spends 15 hours/week in research and 25 hours/week in teaching given her preferences between teaching and research.

The policy maker—in this case, the academic department, the institution, or the state—could design plans that would be intended to entice the faculty member to change her time allocation in ways that are more in line with the preferences of policy makers. Suppose that the department’s administration simply asked

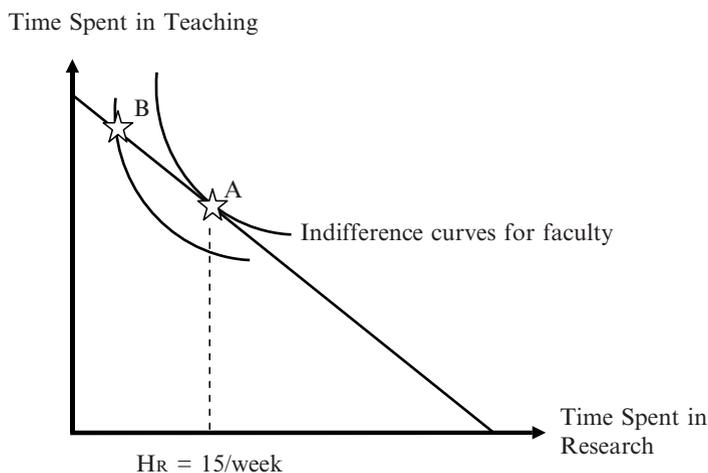


Fig. 8 Depiction of time allocation problem for faculty

the faculty member to increase the amount of time that she spent in teaching. To the individual faculty member, such an increase would be problematic for two reasons. First, it would lead her to choose a time allocation that was not optimal from her point of view. She would have a lower level of utility at point B, for example, than she would at point A, and thus the policy leads to a reduction in utility. Second, due to the time constraint of 40 hours/week, there would be an opportunity cost of increasing her time devoted to teaching because she would have to forego some of her time spent in research activities. Policies aimed at extolling the virtues of teaching would be viewed by economists as attempts to shift her preferences away from research and towards teaching. These policies may or may not be effective in doing so, and the institution would have difficulty determining if the action plan did indeed change preferences in the intended direction.

Alternatively, economists would normally focus on policies that would affect the constraints faced by the faculty member. The department could shift her time constraint outward to the right by reducing her service commitments because she would now have more discretionary time for both teaching and research. However, there is the risk that with the reduced service load, the faculty member would opt to only spend more time in research. If the time release from service was in exchange for the faculty member teaching an additional course, then this would be viewed as an in-kind subsidy because the additional time could not be used for research. Likewise, the department could provide additional teaching assistants to the faculty member, which would reduce the number of hours she needed to teach each course, and thus lower the “price” that she faced for teaching each course. All of these policies could lead to new equilibrium time allocations that may be in the direction intended by policy makers. However, the faculty reward system has a complex structure and institutions do not have full control over the reward system. For example, incentives or rewards related to opportunities for consulting and more attractive positions at other institutions provide extra-institutional sources of rewards for faculty that could mitigate or offset institutional efforts to adjust intra-institutional reward structures to promote desired changes in faculty behavior.

Using Economic Models for Access-Related Policy Analysis in Higher Education

Economic theories, models and their diagrammatic forms give perspective or provide frameworks for policy analysis in higher education. Some of the most prominent examples of such theories or models would include the theory of consumer behavior, human capital theory, the market model of demand and supply—including related concepts such as elasticity of demand—and microeconomic theories of the firm. This section will begin by identifying a specific policy problem or area and

consider some types of “policy levers” that are relevant to the policy problem areas. For example, *access* to higher education is an important and critical policy problem area in higher education, and relevant policy levers would include federal grants and loans for students, state need-based or merit-based grants to students, and state and local appropriations to institutions.

Economic theories and models are the sources economists use to identify policy levers for addressing particular policy problems. For example, if access to higher education is the policy problem, then a key question for economists to ask would be “What policies would rearrange incentives to stimulate behavior by individuals and/or institutions that would promote access to higher education?” Policy levers can arise from federal, state, and institutional levels of policymaking. And the effective policy levers are those that use changes in “incentives” to stimulate changes in individual or institutional behavior that, in turn, promote improvements in a policy problem area like access. For economists, policy analysis is about analyzing how changing specific constraints faced by individuals and institutions alters their behavior and decision-making and moves them from one equilibrium position to another.

In this section we present and examine economic theories and models—in diagrammatic form—to illustrate the usefulness of economic theories and models as frameworks for identifying policy levers and predicting the effects of policy levers—at the federal, state, and institutional levels—on the behavior of individuals and institutions. More specifically, we articulate and illustrate—with diagrams and narrative explanation—how economic models provide a useful theoretical format for policy analysis by identifying policy levers with the potential to change behavior in ways that promote access to, and participation in, higher education. We conceptualize a student’s decision about whether or not to attend college—which can be viewed as the first in a sequence of college-going decisions students make (St. John, 2003)—as an “access” decision and we view policies affecting this decision as access policies (Perna, 2006).

Human Capital Theory: A Framework for Analyzing Demand-Side and Supply-Side Policies to Promote Students’ Access to and Investment in Higher Education

The most prominent of the theoretical frameworks used by economists and other social scientists to analyze students’ college-going decision-making behavior relative to their access to, or participation in, higher education is *human capital theory*. The origins of modern human capital theory are often attributed to the pioneering work of Theodore Schultz (1961) and Gary Becker (1962). However, economists have further developed and refined this theory to the degree that it is now an established branch of labor economics (see, e.g., Ehrenberg & Smith, 2006), it serves as the starting point for many modern studies of investment in education and other forms

of human capital (see, e.g., Avery & Hoxby, 2004), and it constitutes an important component of other theoretical structures in economics such as theories of economic growth and development (see, e.g., Cohn & Geske, 1990).²

Human capital theory views students' decisions to attend college as investments in higher education—an important form of human capital. Economists conceptualize human capital as a set of knowledge, skills, attitudes, abilities and talents that, when embodied in individuals, serve to enhance their productive capacities, and can therefore, be rented to employers in exchange for earnings over the life cycle. Investments in higher education—or other forms of human capital such as health care, on-the-job training, or job search—constitute additions to an individual's existing stock of human capital (Becker, 1993; Belfield, 2000; Ehrenberg & Smith, 2006; Johnes, 1993; Thurow, 1970; Woodhall, 1995). Economists view educational investment decision-makers, whether households or individuals, as seeking to maximize their utility subject to budget constraints. In utility functions, human capital investment is typically specified to affect utility directly or indirectly through its effects on other arguments in the utility function such as income or consumption (see, e.g., Becker, 1993; Belfield, 2000; Card, 1999; Checchi, 2006; McMahon, 1984; Thurow, 1970).

One straightforward specification is to assume that students allocate the resources available to them, as defined by their budget constraint, between investments in education and consumption expenditures on all other goods in order to maximize their utility across the life cycle (DesJardins & Toutkoushian, 2005; Paulsen & Toutkoushian, 2006b). This format assumes students engage in “constrained optimization” behavior by seeking to maximize their utility—based on their individual preferences for various combinations of higher education and other goods acquired through investment and consumption decisions—subject to the limits of their time and budget constraints. Human capital theory assumes that students engage in *rational behavior*. In brief, individuals are behaving rationally if each individual makes choices about allocating the resources in their own unique budget constraint between higher education and other goods in ways that

²Human capital theory has received consistent empirical support for over 45 years and has provided insightful explanations of individual and institutional behavior, including decisions about investment in higher education. A central tenet of human capital theory is that education increases an individual's productivity, and therefore leads to higher future earnings. Alternative perspectives on the relation between educational attainment and earnings have emerged over the years, such as the screening hypothesis (e.g., Spence, 1973), job competition model (e.g., Thurow, 1975), dual labor market hypothesis (e.g. Doeringer and Piore, 1971), and social class approach (e.g., Bowles and Gintis, 1976). A thorough analysis of these contributions is beyond the scope of this chapter; however, each approach offers an important perspective and should be studied in conjunction with human capital theory.

maximize their utility in accordance with their own unique and subjective preferences (DesJardins & Toutkoushian, 2005; Paulsen & Toutkoushian, 2006b).³

Human capital theory assumes that, in order to maximize their utility, when students make college-related investment decisions they compare the expected benefits with the expected costs of college (Carnoy, 1995; Checchi, 2006; Ehrenberg & Smith, 2006; Kaufman & Hotchkiss, 2000; McConnell et al., 2003; McMahon & Wagner, 1982; Paulsen, 2001a; Psacharopoulos, 1973). The earnings differential between college graduates and high school graduates—which continues to increase throughout most of the working life span (Murphy and Welch, 1989, 1992; McMahon & Wagner, 1982)—is quite substantial in magnitude (College Board, 2006a) and constitutes the primary monetary benefit that students expect to receive because of their investment in higher education. The primary monetary costs that students expect to pay for their investment in college include direct, out-of-pocket costs such as tuition and fees, books and supplies, commuting, and incremental living costs, as well as indirect opportunity costs due to the earnings foregone while attending college (Arai, 1998; Becker, 1993; Belfield, 2000; Checchi, 2006; Palacios, 2004).

Figure 9 portrays the most important monetary benefits and costs associated with the college-going investment decision for a recent high school graduate. Two possible earnings streams appear in the figure. The CC line portrays the expected earnings stream for a recent high school graduate who attends college without delay, incurs direct costs while attending college, does not work while attending college, and graduates in four years. This earnings stream is negative during the college years when the student is not working and the direct costs of college are incurred. After college graduation, the CC line continues at a positive level of earnings which rises at a substantial rate throughout the lifespan. The HH line portrays the expected earnings stream for a recent high school graduate who enters the workforce by taking a full-time job instead of going to college. This earnings stream is assumed

³The meaning of the rational behavior assumption is very important but it is often misunderstood and applied in ways that are misleadingly restrictive. Each individual's preferences for different combinations of higher education and other goods, or the values she assigns to them, are by definition, highly subjective, idiosyncratic and unique to each individual. Preferences for various combinations of higher education and other goods vary considerably across individuals, because the formation of preferences is uniquely shaped by each individual's distinctive experiences, access to information, values, attitudes, and beliefs, which in turn are influenced by individual differences in home, school and community environments. Budget constraints also vary substantially across individuals, particularly due to differences in incomes and the prices of higher education and other goods and services for different individuals and households. Therefore, *rational behavior* means that two individuals with identical budget constraints would choose different amounts of higher education and other goods if they have different preferences; and two individuals with identical preferences would make different choices because they face different budget constraints. Paulsen and Toutkoushian (2006b) offer a brief, accessible explanation of what economists mean by rational behavior, and DesJardins and Toutkoushian (2005) provide a comprehensive treatment of the subject.

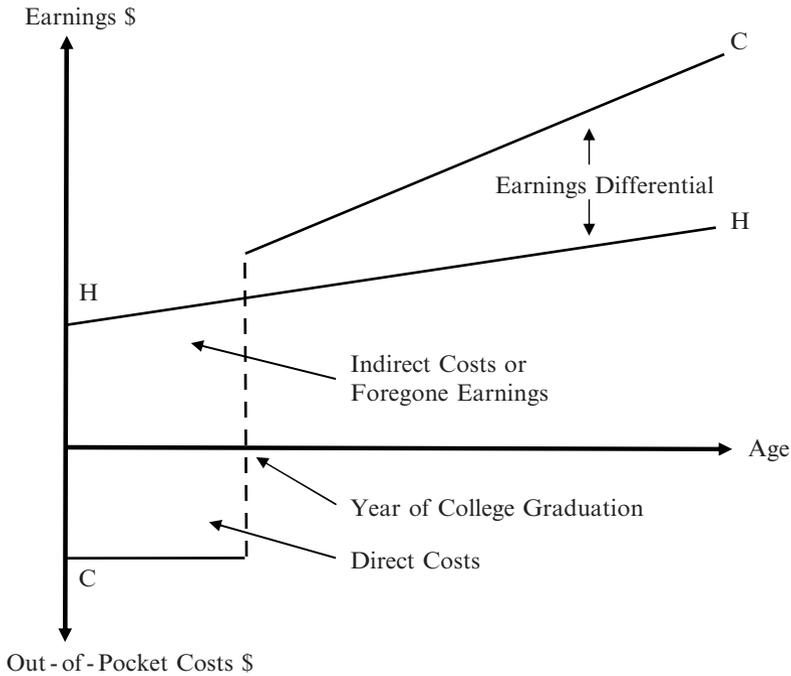


Fig. 9 Benefits, costs and investment in higher education

to start immediately at a positive level and not increase as fast as the CC line over the lifespan.

The most important monetary benefit of college attendance is represented by the *earnings differential*, where the CC line exceeds the HH line by increasing amounts across a typical 43-year post-college work life (i.e., $65 - 22 = 43$ years). In order to acquire these monetary benefits, each student compares them to the expected costs of college attendance. The two most important monetary costs of college are represented as the *direct costs* which comprise the out-of-pocket expenses for tuition and fees, books, commuting, and living costs related to college attendance, and the *indirect costs* or *foregone earnings* which equals the income a college student could have earned by entering the workforce with their high school diploma instead of going to college.

As noted previously, human capital theory assumes that when students decide whether or not to attend college they compare the expected utility of going to college with the expected utility from not going to college. In general, attending college would be perceived as a worthwhile investment when the expected utility from going to college exceeds the expected utility of not going to college. Economists describe the expected utility of each choice as being affected by the costs and benefits of each choice. For higher education, the cost includes the direct and indirect costs of acquiring a higher education, and the benefit is the future

income stream that students expect they will realize if they pursue a postsecondary education.⁴ Accordingly, the investment in human capital model usually focuses on the costs and benefits of each choice and not the utility of each choice. Because the comparative statics of the investment in human capital model are the same regardless of whether one examines the costs and benefits of each choice or the utilities of the costs and benefits of each choice, the analysis of educational policies would not be affected by this simplification.

Even this stylized presentation of the human capital model provides a useful general framework for identifying policy levers and predicting the effects of policy levers—at the federal, state, or institutional, levels—on the students' decisions regarding whether or not to participate in college. In broad terms, the human capital model indicates that policies that either decrease the expected costs of college or increase the expected benefits of college would increase the likelihood that a student would choose to attend college. Research on the effects of each of the primary components of expected benefits and expected costs on student enrollment decisions has generated consistent findings in support of the key elements of the human capital model. For example, research has shown that the likelihood that a student will invest in college is positively related to the earnings differential between college and high school graduates (see, e.g., Averett & Burton, 1996; Freeman, 1976; Kane, 1999; Murphy & Welch, 1992; Paulsen & Pogue, 1988; Rouse, 1994; Rumberger, 1984). In addition, research has consistently shown that students' enrollment decisions are negatively related to the direct costs of college attendance, such as tuition and fees, books and living costs (Avery & Hoxby, 2004; Heller, 1997, 1999; Kane, 1995, 1999; Leslie & Brinkman, 1988; McPherson & Schapiro, 1991; Paulsen, 1998, 2000; Paulsen & Pogue, 1988; Paulsen & St. John, 2002; Rouse, 1994). Finally, research has consistently indicated that students' enrollment decisions are also negatively related to the indirect costs or foregone earnings (i.e., opportunity costs) of college (Heller, 1999; Kane, 1995, 1999; Long, 2004; Paulsen, 1990; Rouse, 1994).

A more precise algebraic presentation of the human capital model portrays students' college-going decision-making in terms of the present value method and the internal rate of return method. The expected benefits of higher education accrue and the expected costs are incurred over time, so that attention to the time value of money is important for a more precise derivation and statement of the criterion for identifying a profitable or worthwhile human capital investment decision. Using the present-value approach, a student would view an investment in higher education as profitable when the present discounted value (PDV) of the benefits of college—

⁴In a more complete analysis (see, e.g., McMahon and Wagner, 1982), this model would also include non-monetary costs and benefits as well, such as the psychic costs of college related to the time and effort associated with studying or the improvement in one's health, expansion of one's ability to enjoy non-market activities, and the consumption benefits of the college experience. Any examination of the well-known problems of identification and measurement of non-market costs and benefits, while posing an important challenge in the context of human capital theory, is beyond the scope of this chapter.

expressed in Equation (1) as the earnings differential between college and high school graduates ($E_t^C - E_t^H$)—exceeds the present discounted value (PDV) of the direct costs (C_t), plus the indirect costs or foregone earnings (E_t^H) during college.

$$\sum_{t=5}^T \frac{E_t^C - E_t^H}{(1+i)^t} > \sum_{t=1}^4 \frac{C_t}{(1+i)^t} + \sum_{t=1}^4 \frac{E_t^H}{(1+i)^t} \quad (\text{Equation 1})$$

The symbol (i) in Equation (1) represents the market rate of interest used to discount the value of future streams of costs and benefits, while the symbol (r) in Equation (2) represents the *internal rate of return* on the investment, which equals the interest rate that equates the PDV of the benefits of college and the PDV of the costs of college.

$$\sum_{t=5}^T \frac{E_t^C - E_t^H}{(1+r)^t} = \sum_{t=1}^4 \frac{C_t}{(1+r)^t} + \sum_{t=1}^4 \frac{E_t^H}{(1+r)^t} \quad (\text{Equation 2})$$

Using both the internal rate of return (r) and the market rate of interest (i), the following criterion indicates whether or not an investment in college would be profitable: the investment would be profitable when the internal rate of return (r) exceeds the market rate of interest (i) (Arai, 1998; Carnoy, 1995; Checchi, 2006; Cohn & Geske, 1990; Ehrenberg & Smith, 2006; Johnes, 1993; Kaufman & Hotchkiss, 2000; McConnell et al., 2003; McMahon & Wagner, 1982; Paulsen, 2001a).

This algebraic portrayal of the higher education investment decision in the human capital model provides a more refined framework for identifying policy levers—at the federal, state, institutional, or private levels—that can be used to influence students' decisions regarding whether or not to participate in college. For example, policies that provide subsidies to students—such as financial aid in the form of grants, scholarships, or loans from governmental, institutional or private sources—could serve to expand the budget constraints faced by students by providing them with increased funding to pay for the out-of-pocket or direct costs of college (C_t). Those students who experience such positive changes in their budget constraints would, all else equal, be more likely to choose to attend college and invest more in higher education (see, e.g., Catsiapis, 1987).

Even though the diagrammatic and algebraic portrayals of the human capital models presented above provide useful insights for identifying and predicting the effects of various policy levers on students' decisions about whether or not, and how much, to participate in higher education, there is a more comprehensive, complex and policy-specific diagrammatic presentation of the human capital model that is the most productive and revealing framework for identifying policy levers and predicting the effects of policy levers—at the federal, state, institutional, or private levels—on the students' decisions regarding whether or not to participate in college. This is the model of supply and demand in the market for funds to invest in higher education. It reveals and clarifies, for representative individuals or groups, both broad categories and specific types of policy levers that are available to influence both supply-side and demand-side factors affecting the college-going decision-making of students and their families.

This model of supply and demand in the market for funds to invest in higher education was developed by Nobel laureate Gary Becker (1967, 1975, 1993); Jacob Mincer applied the model in his study of the distribution of labor incomes (1993); and Walter McMahon estimated the coefficients of the equations for the *demand* for investment in higher education and for the *supply* of funds to invest in higher education, in a series of studies, estimating the equations separately for samples of whites, blacks, males, females, and students from all race and gender groupings in the lowest income quartile (1976, 1984, 1991). This comprehensive, theoretically-sound, empirically-supported model is useful for policy analysis in higher education for the following reasons: it serves as a very productive framework for explaining why some students, or groups of students, are more advantaged and others are more disadvantaged in the market for funds to invest in higher education; it provides, for representative individuals or groups, a useful framework for identifying specific types of policy levers—on both the supply-side and the demand-side of the market—that coincide with constraints faced by students and their families when making college-going decisions; and it provides an analytical structure for predicting the effects of policies that change constraints in ways that enable and prompt students to invest in higher education and participate in college.

The notions of *marginalism* and the method of *marginal analysis* are central concepts from microeconomics and constitute important foundational elements for constructing the logic of problems relating to educational policy (Frank, 2003; Paulsen & Toutkoushian, 2006b; Pindyck & Rubinfeld, 2005). For example, human capital theory assumes that when students consider whether or not to invest in an additional unit of education—such as one year, or two years, or four years of college—they compare expected benefits to expected costs in order to make informed and utility-maximizing decisions. Economists view such decision-making challenges as exercises in constrained optimization—i.e., students choosing in ways that will maximize their satisfaction or utility subject to relevant budget and time constraints. Economists view a student's decision regarding whether or not to invest in a college education as decision-making “at the margin.” In other words, because marginal is a synonym for “incremental” or “additional,” when a student is considering whether or not to invest in an additional unit of education, he or she will compare the “marginal” benefits with the “marginal” costs of such a decision. As long as the marginal benefit of an option exceeds the marginal cost, the decision maker would find it to his or her advantage to pursue the option, and vice versa.

Based on the framework of the human capital model portrayed in Fig. 9, and the precise expression of the investment decision criterion as expressed in Equations (1) and (2), we know that it would be profitable for a student to invest in higher education as long as the internal rate of return (r) exceeds the market rate of interest (i). This investment criterion is completely consistent with marginal analysis, because the internal rate of return (r) reflects the marginal benefit (MB) of an additional unit of investment in higher education in percentage terms (i.e., $MB = r$), and the market rate of interest (i) represents the marginal cost (MC) of an additional unit of investment in higher education in percentage terms (i.e., $MC = i$) (see, e.g., Becker, 1993;

McMahon, 1984; Mincer, 1993; Paulsen, 2001a). In the model of supply and demand in the market for funds to invest in higher education constructed below, MB will be defined as the “marginal rate of return” on each additional dollar invested in higher education and the MC will be defined as the “marginal interest cost” for each additional dollar invested in higher education.⁵

The presentation of this model of human capital theory is informed by the original work of Becker (1975, 1993), the applications by Mincer (1993), and the empirical studies of McMahon (1976, 1984, 1991); as well as by the nature of its presentation and explanation in a number of textbooks and related scholarly work in labor economics and the economics of education (see, e.g., Arai, 1998; Card, 1999; Kaufman & Hotchkiss, 2000; McConnell et al., 2003; Paulsen & Smart, 2001). In order to construct the overall framework of the model, the supply side will be presented first, followed by the demand side, and a combination of demand and supply that helps portray the meaning of reaching equilibrium for individuals and groups in the market for funds to invest in higher education. Then, the overall framework is used to identify policy levers that can be used to change constraints faced by students in ways that promote changes in the behavior of individual students or groups of students and increase their likelihood of participation in higher education.

Figure 10 presents the supply of funds in the model of the market for funds to invest in higher education. The supply curve illustrates the dollar amounts (\$) of different types of funds available at different levels of marginal interest cost (i) for a representative individual student or group of students. In order to fully illustrate the different quantities and different types of funds available at different levels of marginal interest cost, we use a stair-step format to portray the supply of funds. In subsequent analyses, however, we also present supply of funds curves in their more common and simpler upward-sloping format. For the given supply curve in Fig. 10 (S), 0\$₁ dollars of “grant” funds are available at zero marginal interest cost (i.e., $i = 0$). From the perspective of students, grants are the least costly and most desirable source of funds and this “grants” category includes sources of funding referred to as grants, scholarships, and private gifts from federal, state, institutional or private sources—including students’ parents. Only a small portion of all students are in a position to finance all the costs of their higher education from zero-marginal-interest-cost grant or gift sources and most of those individuals are students from relatively high-income households. The relative availability of zero-marginal-interest-cost grants is an important source of a substantial amount of segmentation in the market regarding the supply of funds for students. The primary reason for this

⁵The marginal rate of return (r) is the yield or expected net economic payoff to an investment, defined as the “value of the (discounted lifetime) gains due to an individual’s education expressed as a percentage of the (discounted) costs to the individual of acquiring that education” (Johnes, 1993, p. 28). The market rate of interest (i)—defined in this model as the marginal interest cost from an additional dollar of investment in higher education—equals “either the rate at which interest income could have been earned if the individual’s funds had not been spent on college or the rate at which interest costs would have to be paid to acquire the funds necessary to make the college investment” (Paulsen, 2001a, p. 60).

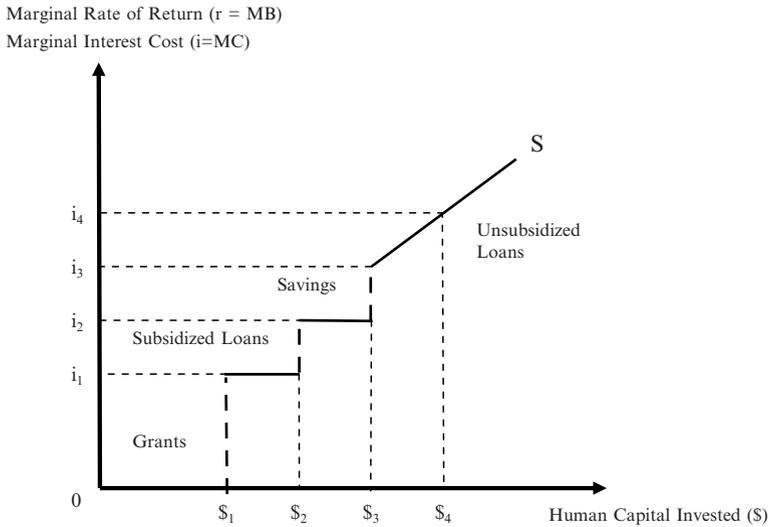


Fig. 10 The supply of funds for investment in higher education

market segmentation is due to the substantial variation in the family incomes and wealth of college-bound students and the concomitant variation in students' receipts of gifts from parents to finance none, some, or all of their higher education. In many instances, policies that result in grants for students from federal, state and institutional sources instead of parental or other family sources—e.g., Pell grants—are intended to address the inequities that arise from this market segmentation due to the unequal distribution of family income and wealth in the nation.

Once funds at a marginal interest cost of zero are exhausted, students must turn to types of funds available at various non-zero marginal interest costs to finance their education. The category of funds with the second-lowest marginal interest cost is subsidized student loans (e.g., subsidized Stafford loans). In Fig. 10, $\$1$ – $\$2$ dollars of subsidized loans are available at a non-zero marginal interest costs of i_1 . Subsidized Stafford loans, along with Pell grants, of course, were designed to increase the availability of zero-or-low-interest-cost funds for low-income students, thereby expanding their budget constraints to enable and promote their participation in higher education (Mumper, 1996; St. John, 1994, 2003). Next, $\$2$ – $\$3$ dollars of funds are available to students who are able to draw upon their own savings, such as earnings from summer jobs and the like. When students use their own savings to finance college investment, they give up the chance to earn interest income on the balance of those funds in an interest-earning asset, such as a savings account. The marginal interest cost of these funds is the rate at which students forego interest income on their savings, indicated in Fig. 10 as i_2 . Finally, once funds from grants, subsidized loans, and savings are exhausted, students turn to unsubsidized loans, avail-

able at increasingly higher marginal interest costs equal to or greater than i_3 or i_4 .⁶ The shift in federal policy away from grants—with a marginal interest cost of zero—and towards loans with marginal interest costs ranging from a minimum of i_1 to a maximum reaching higher than i_4 has necessarily resulted in an increase in the average marginal interest cost of funds for many students—especially those eligible for federal need-based grants (College Board, 2006b; St. John, 2003).

The demand for investment in higher education is presented in Fig. 11. The demand curve (D) illustrates the relationship between the amounts of dollars invested in higher education (\$) and the marginal rate of return (r) on each additional dollar invested in higher education. As explained above, the marginal rate of return equals the internal rate of return (r) from Equation (2). The demand for investment in higher education is downward-sloping for several reasons. For each additional investment a student makes in higher education, the number of years over which the student can benefit from the college-high school earnings differential decreases, the direct (tuition) and indirect (foregone earnings) costs increase, and a student's future earnings and productivity increase at a diminishing rate because additional human capital is being added to limited mental, physical, and temporal capacities of an individual—i.e., the law of diminishing returns in the production of human capital is in effect. This pattern is clearly illustrated in Fig. 11. Reading from the demand curve (D), when the amount invested is only \$₁, the marginal rate of return on the last dollar invested equals r_3 , but when the amount invested reaches \$₂ and \$₃, then the marginal rates of return decrease to r_2 and r_1 , respectively.

Figure 12 illustrates the equilibrium and optimal level of investment in higher education for a representative individual or group of individuals facing the demand and supply conditions presented in the figure. In order to maximize utility subject to her budget constraint, a student should continue to invest in higher education as long as the marginal rate of return (MB = r) exceeds the marginal interest cost (MC = i) of an additional unit of investment. In Fig. 12, for each amount of dollars invested (\$)—i.e., the horizontal coordinate of each point on the demand curve—the marginal rate of return from the last dollar invested (r) is read as the vertical coordinate off the

⁶ As indicated, we assume that the decision-making unit in our analysis of the market for investment in higher education is the individual student. But this analysis can also be done using the family, or some combination of the student and the family, as the relevant decision-making unit. The analytical framework is highly generalizable and works equally well with the student or the family as the relevant decision-making unit. However, when the decision-making unit is the family, then one feature of the supply of funds curve must be interpreted differently. When the family is the decision-making unit, then family income and parental contributions to their children's education are no longer viewed as a source of zero-marginal-interest-cost funds. Instead, when a family uses "savings" from its income as a source of funds to pay for higher education, these savings have opportunity costs, and the opportunity costs are measured in terms of the marginal interest rate (i_2 in Fig. 10 above) at which the family's savings could have earned interest income if it had not been spent on investment in higher education (see, e.g., McMahon, 1984).

Marginal Rate of Return ($r=MB$)
Marginal Interest Cost ($i=MC$)

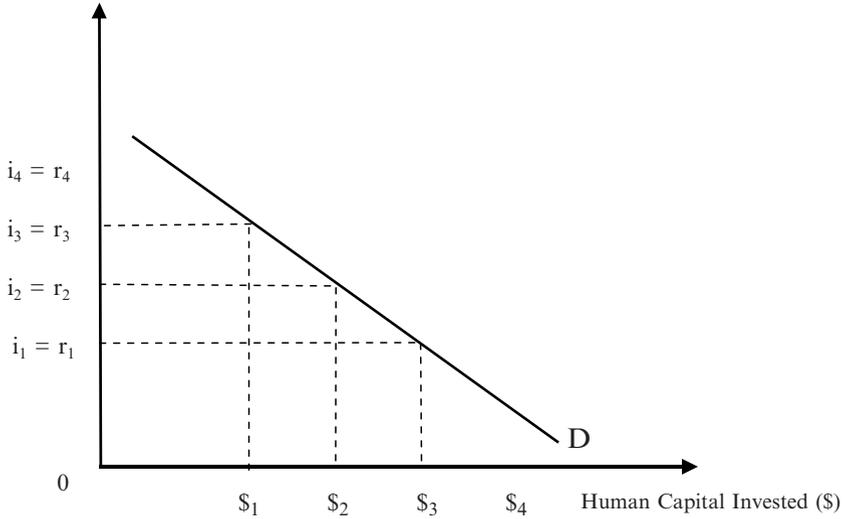


Fig. 11 The demand for investment in higher education

Marginal Rate of Return ($r=MB$)
Marginal Interest Cost ($i=MC$)

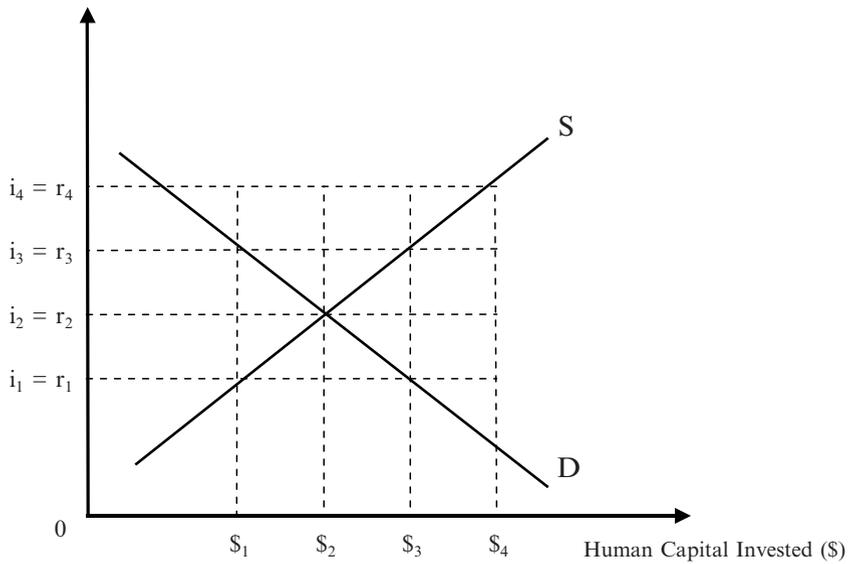


Fig. 12 Supply, demand, and the equilibrium level of investment in higher education

demand curve corresponding to a particular level of investment (\$), while the marginal interest cost of the last dollar invested (*i*) is read as the vertical coordinate off the supply curve corresponding to a particular level of funds for investment (\$)—i.e., the horizontal coordinate of each point on the supply curve. As shown in Fig. 12, when the amount invested in higher education equals \$₁, the demand curve indicates that the marginal rate of return is *r*₃, and the supply curve indicates that the marginal interest cost is only *i*₁. Because *r*₃ exceeds *i*₁, increased investment in higher education would clearly be profitable for the student. The marginal rate of return continues to exceed the marginal interest cost of funds until the level of investment reaches \$₂, where the marginal rate of return equals the marginal interest cost of funds for the last dollar invested, which means \$₂ would be the equilibrium level of investment and the amount of investment that would maximize the student’s utility subject to a budget constraint (Arai, 1998; Kaufman & Hotchkiss, 2000; McConnell et al., 2003; McMahan, 1984; Paulsen, 2001a).

Supply, Demand, and Policy Levers in the Market for Funds to Invest in Higher Education

In this section we present specifications for the supply and demand functions that include arguments defining the relevant supply-side or demand-side conditions or constraints faced by representative individuals or groups in the market for investment in higher education. In order to develop the most useful and straightforward specifications for supply and demand functions, the particular supply and demand specifications presented and used in this analytical model are informed by, but not identical to, the original specifications of Becker (1967, 1975, 1993), the specification and empirical estimation of the supply and demand functions by McMahan (1976, 1984, 1991), as well as by additional research on factors influencing the rates of return (see, e.g., Card, 1999) and factors influencing students’ likelihood of participation in and/or level of investment in higher education (see, e.g., Ellwood & Kane, 2000).

Using this approach, the supply function in Equation (3) is consistent with Becker’s original conceptualization of inter-individual or inter-group differences in supply conditions as representing *constraints* on the “opportunities” students have to access funds for investment in higher education—manifested as differences between supply curves in the marginal interest cost (*i*) at which various amounts of funds (\$) are available (1975, 1993).

Supply Function:

$$S_s = f(i, Y, G, L) \tag{Equation 3}$$

Where

- i* = the marginal interest cost of each additional dollar invested
- Y* = disposable income of the student’s family

G = grants, which includes sources of funding referred to as grants, scholarships, or gifts from federal, state, institutional or private sources

L = loans available to lower and middle income students through a means test

All arguments besides “i” in the supply function represent shift parameters that change the position of the overall supply curve. Therefore, the shift parameters constitute a set of potentially fruitful policy levers that could effectively change supply conditions and constraints in ways that expand students’ opportunities to invest in college (i.e., supply-side constraints) and thereby promote access to higher education.

Figure 13 presents two different supply curves in the market for funds to invest in higher education. Each supply curve represents a set of supply conditions or *constraints* faced by a representative individual or group of individuals in the market. These conditions or constraints can make some students more *advantaged* and others more *disadvantaged* in the market for funds to invest in higher education. It is evident from Fig. 13 that the marginal interest costs (i) at which various dollar amounts of funds are available clearly present a more advantaged set of supply conditions or constraints for those individuals or groups who face supply curve S_2 compared to those who face supply curve S_1 in the market for funds to invest in higher education. For example, supply curve S_1 starts with a horizontal portion from 0 to $\$1$ and continues with an upward-sloping portion from its horizontal intercept at $\$1$ to S_1 , and supply curve S_2 starts with a horizontal portion from 0 to $(\$3 + \$4)/2$ and continues with an upward-sloping portion from its horizontal intercept at $(\$3 + \$4)/2$ to S_2 .

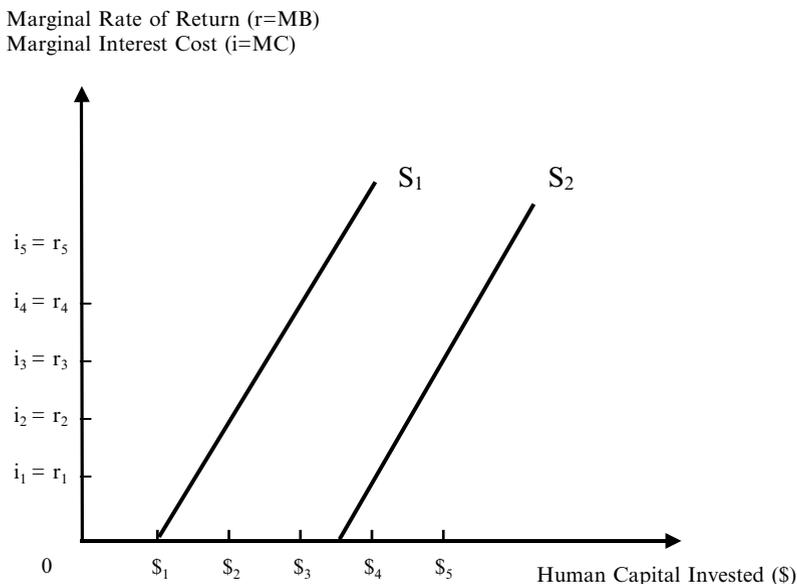


Fig. 13 Supply conditions and advantage and disadvantage in the market for investment in higher education

The horizontal portion of each of the two supply curves, S_1 and S_2 , indicates the amount of funds available to a student from zero-interest-cost sources, such as grants, scholarships, and gifts from federal, state, institutional and private sources, including parents.

One of the most prominent determinants of the position of the supply curve of funds to invest in higher education is family income (Y in Equation (3)) and/or wealth (Becker, 1967, 1975, 1993; McMahon, 1976, 1984, 1991). Many students from moderately to very wealthy families have access to zero-interest-cost funding for college from their parents in amounts that are often sufficient to cover a portion, if not all, of the costs of college attendance. More specifically, Ellwood and Kane (2000) estimate that parents of students from the top income quartile pay \$4,083 more of their children's college costs at public institutions and \$8,420 more at private institutions than those in the lowest income quartile. In terms of the supply curves in Fig. 13, inter-family differences in income and wealth could be responsible for a substantial share of the difference in the horizontal intercepts of S_1 and S_2 and the amounts of zero-interest-cost funds available—i.e., 0 to $\$_1$ versus 0 to $(\$_3 + \$_4)/2$ under the two sets of supply conditions. There is broad support in the literature for the hypothesis that family income has a positive effect on enrollment (Ellwood & Kane, 2000; Hossler et al., 1999; Kane, 1999; Perna, 2000), and that gaps in participation rates between income groups are both substantial and persistent (see, e.g., Mumper & Freeman, 2005; Thomas & Perna, 2004).

We are currently in a period of increasing rather than decreasing gaps in income between higher and lower income classes; therefore equalizing access to higher education—where more investment in higher education leads to greater future income—could be a potentially productive long-term method to achieve a more equal distribution of income. Many economists and other policy analysts have contended that the existence of substantial positive externalities arising from investment in higher education constitutes a compelling rationale to prompt government to intervene in the market for investment in higher education with grants for students that are intended to expand students' budget constraints and promote greater participation and investment in higher education (Baum, 2004; Breneman & Nelson, 1981; Paulsen, 2001b; Paulsen & Toutkoushian, 2006a). The greatest challenge in this regard is based on the ongoing, but only moderately successful, efforts of economists and other policy analysts to identify the nature, and measure the magnitudes, of all the sources of positive externalities due to investment in higher education (Baum & Payea, 2004; Bowen, 1977; Fatima & Paulsen, 2004; Institute for Higher Education Policy, 2005; Paulsen & Fatima, 2007). The primary sources of zero-marginal-interest-cost grants to students have included federal need-based and state need-based grant programs, as well as a rapidly increasing pool of state merit-based grants for all merit-eligible students regardless of need (College Board, 2006b; Heller, 2006; Mumper & Freeman, 2005).

The demand function in Equation (4) is also consistent with Becker's original conceptualization of differences in demand functions as representing constraints on the "capacities" students have to benefit from investments in human capital—manifested as differences between demand curves in the marginal rates of return (r)

for various amounts invested (\$) (1967, 1975, 1993). All arguments besides “ r ” in the demand function represent shift parameters that change the position of the overall demand function. Therefore, the shift parameters constitute a set of potentially fruitful policy levers that could effectively change demand conditions and constraints in ways that expand students’ capacities to benefit from those investments (i.e., demand-side constraints), thereby promoting access to higher education.

Demand Function:

$$D_s = f(r, A, FB, SQ) \quad (\text{Equation 4})^7$$

where

- r = the marginal rate of return for each additional dollar invested
- A = ability as measured by test scores or school grades
- FB = family background, such as parents’ education, income, occupation
- SQ = school quality measured by indicators of school resources such as pupil-teacher ratios, teacher salaries, or length of school year (see, e.g., Card & Krueger, 1992)

Figure 14 presents two different demand curves in the market for funds to invest in higher education. Each demand curve represents a set of demand conditions or constraints faced by a representative individual or group of individuals in the market. These conditions or constraints can make some students more advantaged and others more disadvantaged in the market for funds to invest in higher education. The marginal rates of return (r) corresponding to various dollar amounts invested in higher education clearly present a more advantaged set of demand conditions or constraints for those individuals or groups who face demand curve D_2 compared to those who face demand curve D_1 in the market for investment in higher education. For example, in Fig. 14, for a representative individual or group whose demand conditions or constraints are portrayed along demand curve D_1 , when the amount invested is $\$_2$, the marginal rate of return on the last dollar invested equals only r_2 . However, for a representative individual or group whose demand conditions or constraints are portrayed along demand curve D_2 , when the same amount is invested ($\$_2$), the marginal rate of return on the last dollar invested is much higher at $(r_4 + r_5)/2$. Similar vertical differences in the marginal rates of return between the two demand curves can be observed for each amount of dollars invested.

One of the most prominent determinants of the rates of return to education, and therefore, the position of the demand curve for investment in higher education is student ability (A in Equation 4) (Arai, 1998; Becker, 1993; Card, 1999; Cipillone,

⁷ A careful study of the issues of measurement, specification, endogeneity, and selection bias in the estimation of rates of return to education is beyond the scope of this chapter. We encourage readers to consult the recent reviews of this literature by Ashenfelter and Rouse (2000) and Card (1999). Another specification of the demand for human capital could include an indicator of college quality (see, e.g., Dale and Krueger, 1999; Monks, 2000; Zhang and Thomas, 2005); however, this is not included in Equation (4) because our analysis focuses on the access decision of students regarding whether or not to attend college, but *not* the student choice of which college to attend.

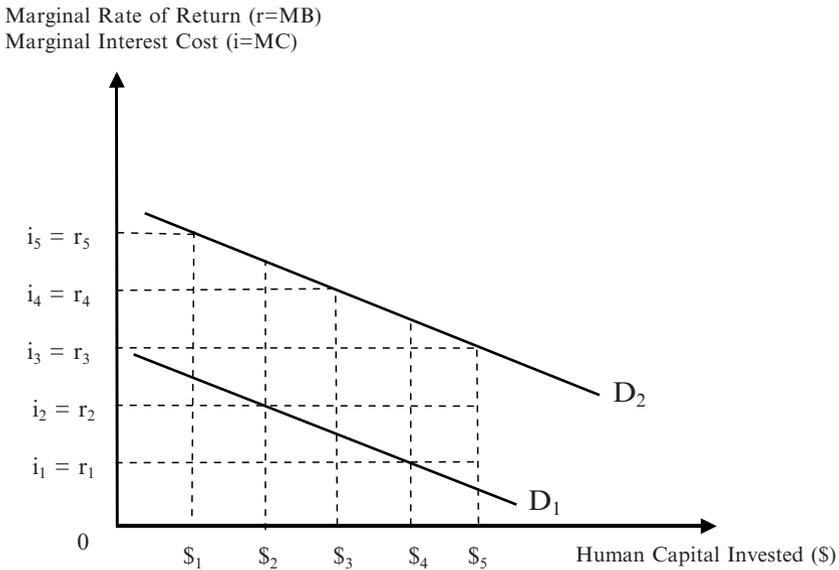


Fig. 14 Demand, advantage and disadvantage in the market for investment in higher education

1995; Leslie & Brinkman, 1988; McMahon, 1976, 1984, 1991; Monks, 2000; Taubman & Wales, 1974; Woodhall, 1995). Students of higher ability tend to have higher rates of return than those of lower ability. Therefore, all else equal, D₂ would illustrate the demand for investment in higher education for students with higher ability and D₁ would represent the demand for investment in higher education for students with lower ability. The positive correlation between ability and earnings has been explained in a number of understandable ways. For example, some economists explain the differences in rates of returns between different demand curves in terms of interpersonal differences in ability, broadly conceived. Becker (1993) explains that higher demand curves represent higher rates of returns because “persons who produce more human capital from a given expenditure [on human capital] have more capacity or ‘ability’” (p. 124), and Mincer (1993) concurs that “differences in levels of demand curves represent individual differences in productivities, or abilities” (p. 56). Other economists have argued that an individual’s ability is related to a form of initial “pre-school” or “pre-existing” endowment of human capital that can be subsequently used to more productively acquire additional human capital (Cipillone, 1995; Thurow, 1970). Initial endowments of human capital can directly affect the level of education a student attains, the learning that occurs during schooling, and the earnings and rates of return that occur subsequent to that schooling.

Economists and other social scientists have also found measures of family background—particularly parental education, as well as parental income or occupation—to be related, either directly or indirectly through mediating variables,

to rates of return to education and therefore, to the position of the demand curve for investment in higher education (FB in Equation 4) (Behrman et al., 1992; Card, 1999; Jencks, 1972, 1979; Korenman & Winship, 2000; McMahan, 1976, 1984, 1991; Sewell & Hauser, 1976; Taubman & Wales, 1974). Therefore, all else equal, D_2 would illustrate the demand for investment in higher education for students with more advantaged family backgrounds and D_1 would represent the demand for investment in higher education for students with less advantaged family backgrounds.

There are a number of reasons that those from more advantaged family backgrounds tend to have higher rates of return to educational investments. As one example, McMahan (1984) offers this explanation for including mother's education as his measure of family background in his investment demand function: "The hypothesis is that home investments in children, when the mother has more education, raises the IQ or ability of the child...and also, especially if the mother has been to college, shifts the utility function toward greater farsightedness. Both imply larger investment in education." (p. 82). This "farsightedness" of college-educated parents is quite important and refers to the greater likelihood that college-educated parents are well aware of the benefits of college, well-informed about the nature and extent of such benefits and all of the arrangements, resources and efforts that are necessary to acquire them, and therefore place a high value on the benefits of college—most of which would accrue in the future. As a result, college-educated parents would be more willing to forgo present consumption for future benefits from investment in college and accordingly would use a smaller rate to discount future earnings and would expect higher rates of return to investments. When children have the opportunities to inherit or adopt this information and these values, insights, beliefs, and perspectives from their parents, they acquire an early form of human capital—produced in the home or family environment—that can enhance their propensity for educational investment, as well as the productivity and fruitfulness of their investment, both in terms of the quantity and quality of the education they acquire and their subsequent earnings in the job market throughout their careers.

Another important determinant of rates of return, and therefore, the position of the demand curve for investment in higher education is school quality (SQ in Equation 4) (Altonji & Dunn, 1996; Card, 1999; Card & Krueger, 1992, 1996). Students who acquire pre-college education at schools with higher levels of resources—as measured by pupil-teacher ratios, teacher salaries or another indicator of school expenditures per pupil—tend to have higher rates of return than those who attend pre-college schools with fewer resources. Therefore, all else equal, D_2 would illustrate the demand for investment in higher education for students who acquire pre-college education at schools with greater resources and D_1 would represent the demand for investment in higher education for students who acquire pre-college education at schools with fewer resources. According to Card and Krueger (1996), the "most plausible theoretical explanation for a link between school quality and earnings is that—other things being equal—students acquire more skills if they attend higher quality schools (i.e., schools with more generous resources)" (p. 165).

In this section, we examine the ways in which demand and supply curves—for individuals or groups who are advantaged or disadvantaged in the market—interact to generate a variety of possible equilibrium levels of investment under various supply and demand conditions and constraints. Figure 15 combines sets of different supply curves and different demand curves for individuals and/or groups of individuals in the market for funds to invest in higher education. Each supply curve and each demand curve represents a set of supply or demand conditions or constraints faced by a representative individual or group of individuals in the market. These conditions or constraints can make some students more advantaged and others more disadvantaged in the market for funds to invest in higher education. In this context, we can analyze the effects of changes in the shift parameters in the supply and demand functions as policy levers to expand students’ constraints and change individual behavior in favor of more investment in higher education, thereby promoting access.

In Fig. 15, we first consider representative individuals or groups of individuals who are relatively less advantaged on both the supply and demand sides of the market. In other words, students who are not from advantaged family backgrounds, do not have high ability endowments, and did not attend high-quality pre-college schools are best portrayed by demand curve D_1 . If these students are also not from higher-income families and qualify for only need-based grants with limited purchasing power in terms of covering the direct costs of college, their conditions and constraints are best represented by supply curve S_1 . In order to maximize their utility students should invest in units of higher education (\$) as long as the marginal

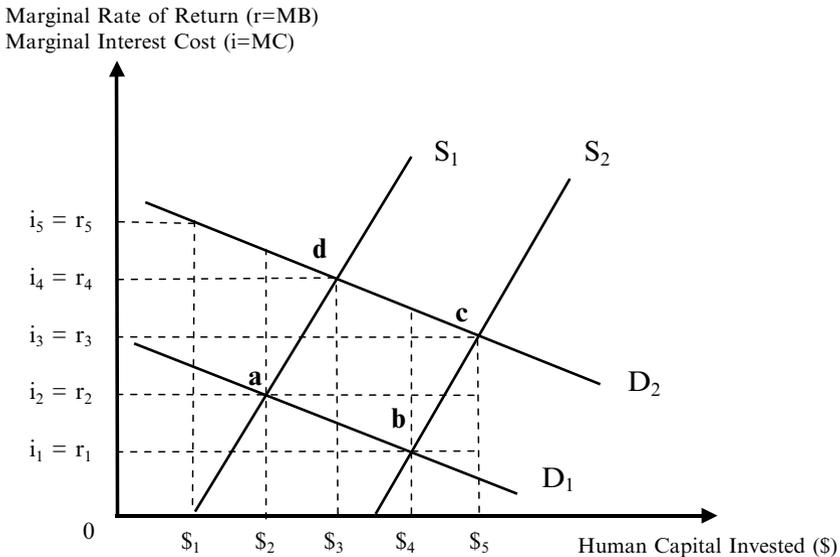


Fig. 15 Supply, demand, advantage and disadvantage in the market for investment in higher education

rate of return exceeds the marginal interest cost of funds required for such investment. For those facing supply and demand conditions S_1 and D_1 , investment would be worthwhile for dollar amounts from 0 up to $\$_2$ —i.e., $r > i$ until dollars invested reaches $\$_2$ at point “a”. All else equal, point “a” is the optimal and equilibrium level of investment in higher education for students with supply and demand constraints S_1 and D_1 .

As noted in a previous section, the primary determinant of differences in supply conditions like those represented by S_1 and S_2 is differences in family incomes. And family incomes, of course, are private sources of zero-marginal-interest-cost funds, usually gifts to children, to pay for college. For lower-income students, supply-side policies can help address their relative disadvantage in the supply of funds for investment by providing public sources of zero-marginal-interest-cost funds in the form of federal and state need-based grants. Substantial increases in need-based grants would expand lower-income students’ budget constraints, shifting them from a supply constraint indicated by S_1 to one better represented by S_2 . Such policies could help address, at least in part, the different availabilities of zero-marginal-interest-cost funds between higher- and lower-income students. If these policy changes move lower-income students from S_1 to S_2 (along D_1), a new equilibrium and optimal level of investment would occur at point “b” where S_2 intersects D_1 and where $\$_4$ dollars are invested in higher education. As illustrated in Fig. 15, for all investment amounts from 0 to $\$_4$ the marginal rate of return exceeds the marginal interest cost of funds, making $\$_4$ the new equilibrium level of investment.

Research indicates that, as predicted by the model, increases in grants are positively related to greater enrollment and investment in higher education (see, e.g., Catsiapis, 1987), and research has demonstrated the positive enrollment effects of need-based grants from federal sources (Leslie & Brinkman, 1988; Manski & Wise, 1983; McPherson & Schapiro, 1991; Dynarski, 2003) and need-based grants from state sources (Ellwood & Kane, 2000; Heller, 1999; Kane, 1999). State merit-based grants have also become popular in recent years and their availability could also help students move from a supply constraint like S_1 to one like S_2 . However, increases in these funds would provide additional zero-marginal-interest-cost funds—usually as an entitlement—for students who are merit-eligible regardless of financial need. Nevertheless, research does indicate that merit grant programs also promote greater participation and investment in higher education (see, e.g., Dynarski, 2004).

We next consider representative individuals from lower-income students—who continue to be the focus of our access-based concern—in an initial equilibrium in their investment decision-making at point “b” in Fig. 15, where the optimal, and utility-maximizing, level of investment in higher education is $\$_4$ dollars. In this instance, at point “b” students are relatively less advantaged on the demand side of the market as illustrated by their demand constraints on demand curve D_1 , but are relatively more advantaged on the supply side of the market as illustrated by their supply constraints on supply curve S_2 . In other words, demand curve D_1 portrays students who do not have high ability endowments, are not from advantaged family backgrounds, and did not attend high-quality pre-college schools. We assume that

the supply-side policies discussed in the previous section were implemented and that the effects of such policies were, as illustrated in Fig. 15, to move the lower-income students—previously in equilibrium at point “a” and facing supply conditions S_1 —to point “b” where their new supply constraints are reflected by supply curve S_2 . Their somewhat more advantaged supply constraints on S_2 reflect the fact that the supply-side policies (increased grants) discussed in a previous section were effectively implemented and these students have already been the recipients of a substantially increased volume of need-based federal or state grants, and possibly also of some state merit-based grants as well.

As noted in a previous section, the primary determinants of differences in demand conditions—and perceived rates of return to educational investment—like those represented by D_1 and D_2 are differences in students’ ability, family background, and pre-college school quality. Each of these determinants of rates of returns—and therefore, of the position of the two demand curves—reveal policy levers that could use demand-side policies to promote changes in the behavior and decision-making of lower-income students that lead to increases in their participation and investment in higher education, thereby addressing the access problem. Although increasing the innate or genetic ability endowments of potential students is not within the grasp of policymakers, policies to promote academic achievement and gains in academic achievement in pre-college schooling do provide accessible policy levers based on demand-side policies in the market for investment in higher education. For example, research on the “achievement model” (see, e.g., Jencks & Phillips, 1999) now provides convincing evidence that academic achievement and gains in academic achievement, as measured by test scores on cognitive tests of knowledge and skills—such as ACT or SAT math, verbal or content area scores—are significantly and positively related to students’ subsequent earnings. In other words, this evidence indicates that differences in measured academic achievement or gains in academic achievement in school positively affect the earnings, and therefore, the rates of return on educational investments for students. Academic achievement is, of course, an important predictor of college participation, particularly among lower-income students; and there are many types of pre-college preparation programs that can help improve students’ academic achievement (see, e.g., Perna, 2005).

Clearly, changing today’s students’ family backgrounds so they are more “advantaged,” such as by increasing the share of today’s students whose parents are college-educated, is not within the grasp of policymakers. However, there are policy levers, based on demand-side policies in the market for investment in higher education, that are available to provide alternative opportunities for today’s youth to acquire some of the knowledge, information, values, insights, beliefs, and perspectives about the costs and benefits of college, the preparatory steps and efforts required to get to college and be successful there, that a family background with college-educated parents could provide. Providing adequate funding for the TRIO programs (Fenske et al., 1997) and funding to support state-level efforts like Indiana’s highly successful postsecondary encouragement experiment (Hossler & Schmit, 1995) and the COACH mentoring program in Boston’s public schools (Avery & Kane, 2004)

serve as excellent examples of such policies.⁸ Unlike many of the other policies considered in our analysis, these demand-side policies do not affect, and are not intended to affect, students' financial constraints; instead, they are targeted to influence how students form their college-going preferences, and therefore, their expected rates of return to investments in college.

The third set of policy levers we consider is also based on demand-side policies in the market for investment in higher education. These policies require increased funding to provide more resources in elementary and secondary schools. Most research on the effects of school resources on students' future earnings has identified specific targets for policy, such as raising teacher salaries and lowering pupil-teacher ratios, both of which would enhance school resources and increase the rates of return to schooling for students in the system (Card, 1999, 2001). For example, Card and Krueger (1996) conducted a meta-analysis of a group of studies of the effect of school resources and students' future earnings. They examined 25 estimates of the effect of school resources on earnings and converted them to comparable elasticities. Their findings showed that all estimated elasticities were positive and nearly all were statistically significant.

Each of the three sets of demand-side policies discussed above can help address the relative disadvantage of the lower-income students on whom our analyses is focused, in terms of the demand for investment in higher education, by increasing the rates of return to further schooling for these students. Policies such as those discussed above—i.e., increasing pre-college academic preparation programs, post-secondary encouragement and information dissemination programs, and per-pupil resources in schools—would increase the rates of return to higher education among lower-income students. This would mean that for each amount of dollars invested in higher education, rates of return would be higher than before the policy changes. This is portrayed diagrammatically in terms of a higher demand curve, because a higher demand curve represents an expansion in the demand-side constraints—i.e., constraints on what students' future earnings would be—for lower-income students.

In terms of Fig. 15, students' initial equilibrium position is at point "b" where D_1 and S_2 intersect. But this expansion in the demand-side constraints would shift students from a demand constraint indicated by D_1 to one better represented by D_2 . If the demand-side policy changes move these lower-income students from D_1 to D_2 (along S_2), a new equilibrium and optimal level of investment would occur at point "c" where S_2 intersects D_2 and where \$ $_5$ dollars are invested in higher education.

⁸This discussion of the effects of students' family backgrounds, such as their parents' educational attainment, on students' future earnings and rates of return to education is akin to the excellent conceptual and empirical work of sociologists interested in the access problem. A thorough examination of the invaluable contributions of educational sociologists to our understanding of the nature and complexity of the issues of access and equity in college-going is beyond the scope of this chapter. However, we encourage readers to consult the following work to explore this vibrant literature, particularly regarding the constructs of habitus and symbolic capital such as cultural and social capital (Bourdieu, 1977a, b; Bourdieu and Passeron, 1990; Coleman, 1988; Horvat, 2001; Lamont and Lareau, 1988; Massey et al., 2003; McDonough, 1997).

For all investment amounts from 0 to $\$_5$ the marginal rate of return exceeds the marginal interest cost of funds, making $\$_5$ the new equilibrium and utility-maximizing level of investment. The equilibrium level of investment in higher education at the higher level of $\$_5$ is the result of identifying and using policy levers on both the supply-side and the demand-side to implement policies that alter the constraints faced by lower-income students in ways that make them relatively more advantaged in this market, increasing their willingness and ability to invest more in higher education, which directly addresses the access problem.

Research indicates that, as predicted by the model, increases in funding for pre-college academic preparation programs, postsecondary encouragement and information dissemination programs, and per-pupil resources in schools are positively related to greater levels of enrollment and investment in higher education (Card, 1999; Card & Krueger, 1996; Ellwood & Kane, 2000; Hossler & Schmit, 1995; Hossler et al., 1999; Jencks & Phillips, 1999; Perna, 2005; Perna & Titus, 2005).

This economic model of the market for funds to invest in higher education is particularly effective at distinguishing between the effects of various types of policy levers on access to higher education. As an example, we use the model next to compare the effects of increases in the supply of grant funds versus loan funds on the higher education participation and investment decisions of students who differ in how advantaged they are in the market in terms of their expected rates of return to investment in higher education. One supply-side policy that is extensively used to help improve access to higher education is to expand the available supply of non-zero marginal-interest-cost funds such as subsidized student loans. In the previous analysis of the effects of increases in the supply of grants to students, the entire supply of funds curve shifted to the right, because grants constitute a zero-marginal-interest-cost funding. An increase in zero-marginal-interest-cost funding, by definition, shifts the horizontal intercept—i.e., the value of $\$$ when $i = 0$ —to the right. However, an increase in the supply of non-zero marginal-interest-cost funds does not shift the horizontal intercept; instead it shifts the supply of funds rightward at the appropriate non-zero marginal-interest cost corresponding to the source of increased funds. In the case of an increase in subsidized student loans, the supply curve will shift rightward at the level of the marginal-interest cost of acquiring additional dollars of subsidized student loans.

In order to fully illustrate the effects of an increase in subsidized loans on the supply constraints and investment in higher education, in Fig. 16 we return to the stair-step format (as used in Fig. 10) for presenting the supply of funds curves. Figure 16 presents two supply curves and two demand curves. As explained previously, students who are not from advantaged family backgrounds, do not have high ability endowments, and did not attend high-quality pre-college schools are best portrayed by demand curve D_1 and tend to have lower rates of return on investments in higher education than the more advantaged students facing demand constraints D_2 . The initial supply of funds curve (S_1) indicates that $0\$_1$ dollars of grants are available at zero-marginal-interest-cost (0), $\$_1\$_2$ dollars of subsidized loan funds are available at marginal interest cost i_1 , $\$_2\$_3$ dollars of savings funds are available at marginal interest cost i_2 , and unsubsidized loans are available at marginal

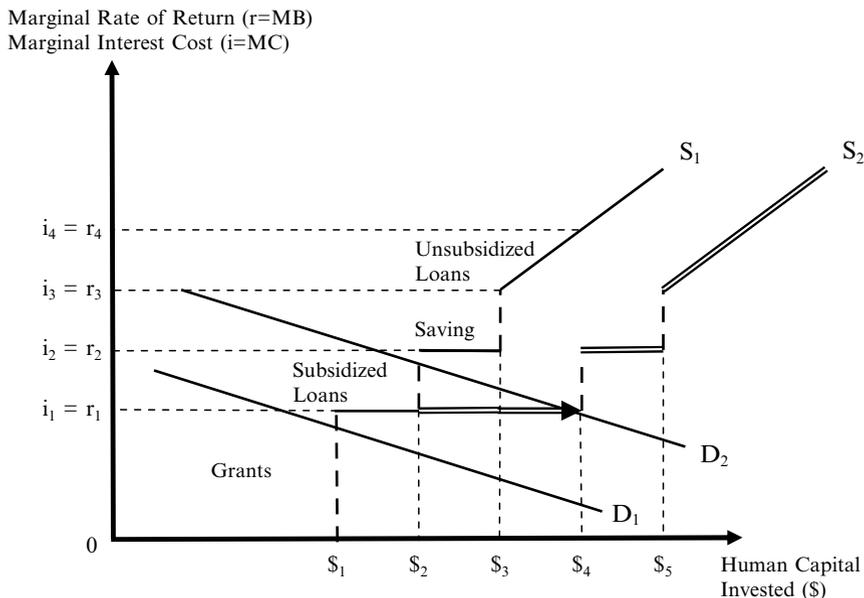


Fig. 16 Supply, demand and investment in higher education: effects of increased supply of subsidized loan funds

interest costs equal to or greater than i_3 . It would be worthwhile for students to keep investing dollars in higher education as long as the marginal rate of return equals or exceeds the marginal interest cost of funds. Therefore, faced with the supply constraints represented by supply curve S_1 , students with demand constraints represented by D_1 will invest $\$1$ dollars, while students with demand constraints represented by D_2 will invest $\$2$ dollars.

Next, consider a supply-side policy change in this context. A substantial increase in available subsidized student loan funds (e.g., subsidized Stafford loans) would result in a shift in the supply of funds from S_1 to S_2 . Because there is no change in the quantity of zero-marginal-interest-cost grant funds available, the horizontal intercept of the new supply curve S_2 remains at $\$1$ dollars, exactly the same as for S_1 . The shift in the supply of funds takes place only because of a substantial increase in available subsidized student loan funds. These funds are available at the marginal interest cost of i_1 ; therefore, the total dollars of these funds available increases from $\$1\2 dollars with supply S_1 to $\$1\4 dollars after the shift to supply S_2 . The increase in the volume of subsidized student loan funds is represented by the double-lined arrow extending from $\$2$ to $\$4$. This increase in loan funds will stimulate greater investment in higher education for some students, but not for others. For students facing demand constraints represented by D_2 , the marginal rate of return now exceeds the marginal interest cost of funds for levels of investment up to $\$4$ dollars, and these students will increase their investment and achieve a new equilibrium and optimal level of investment where S_2 intersects D_2 and where $\$4$ dollars are invested in higher education. However, students facing the more restrictive demand constraints

represented by D_1 will not increase their investment as a result of the increase in available subsidized student loan funds. For every level of investment beyond $\$1$, the marginal interest cost of funds exceeds the marginal rate of return on investment. As a result, no increase in investment would be worthwhile for students facing demand D_1 .

In Fig. 17, we use stair-step supply of funds curves to more fully illustrate the model's predicted effects of increases in grants funds on investment in higher education. As in Fig. 16, there are two supply curves and two demand curves. Once again, students who are from advantaged family backgrounds, have high ability endowments, and attended high-quality pre-college schools are best portrayed by demand curve D_2 and tend to have higher rates of return on investments in higher education than their less advantaged counterparts facing demand constraints D_1 . Given the supply constraints represented by supply curve S_1 , the initial equilibrium and optimal level of investment for students with demand constraints represented by D_1 is $\$1$ dollars, while the initial equilibrium and optimal level of investment for students with the less restrictive demand constraints on D_2 is $\$2$ dollars.

Next, we assume that a substantial increase in grant funds shifts the supply curve from S_1 to S_2 . Because this increase in supply is exclusively due to an increase in zero-marginal-interest-cost grant funds, the shift in supply is represented by a rightward movement in the horizontal intercept of the supply of funds curve, as indicated by the double-line arrow. The horizontal intercept of S_1 was at $\$1$ dollars of zero-marginal-interest-cost funds, while the horizontal intercept of S_2 is at $\$3$

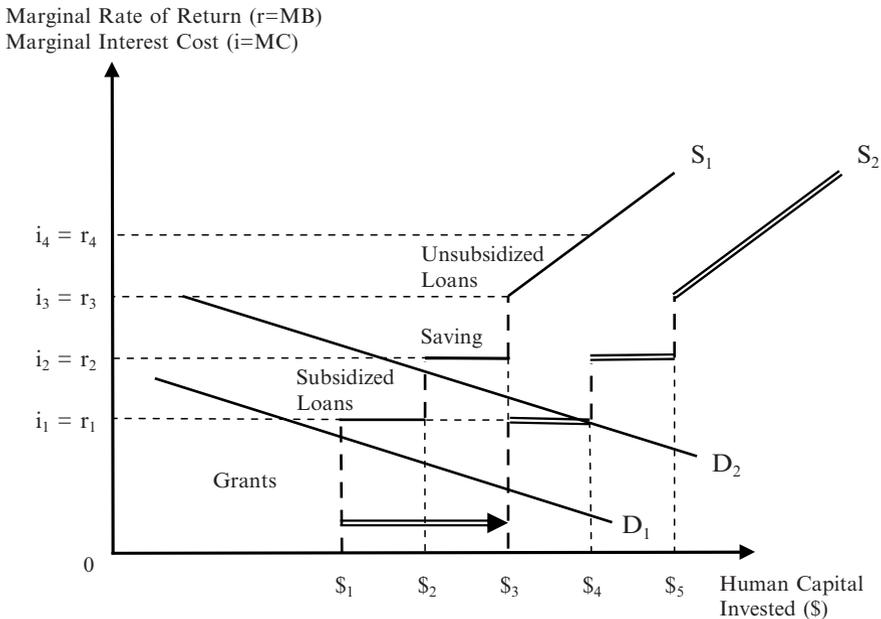


Fig. 17 Supply, demand and investment in higher education: effects of increased supply of grant funds

dollars of zero-marginal-interest-cost funds. The only difference between the two supply of funds curves is that an additional $\$1\3 funds are now available at zero-marginal-interest cost. The total amount of zero-marginal-interest-cost funds available has increased from $0\$1$ to $0\$3$; however, the quantities of each type of the less-desirable non-zero marginal-interest-cost funds (subsidized loans, savings, and unsubsidized loans) available on S_2 are the same as were available on S_1 . Unlike the increase in supply due to more subsidized loan funds—which would stimulate investment in higher education for some relatively more advantaged students, but not for some of their less advantaged counterparts—this increase in supply due to more grants will stimulate greater participation and investment in higher education among both more and less advantaged students. More specifically, for students facing demand constraints of D_2 , the marginal rate of return now exceeds the marginal interest cost of funds for levels of investment up to $\$4$ dollars, and these students will increase their investment up to a new equilibrium and optimal level of investment $\$4$ dollars, where S_2 intersects D_2 . In parallel fashion, for students facing demand constraints of D_1 , the marginal rate of return now exceeds the marginal interest cost of funds for levels of investment up to $\$3$ dollars, and these students will increase their investment up to a new equilibrium and optimal level of $\$3$ dollars, where S_2 intersects D_1 .

In summary, an increase in grants—i.e., an increase in zero-marginal-interest-cost funds—increases the horizontal intercept of the supply curve and stimulates more investment in higher education among both students facing relatively more advantaged and students facing relatively less advantaged demand-side conditions or constraints. However, as show in Fig. 16, increases in supply of funds due only to increases in subsidized student loan funds produces an increase in the supply of funds only at the non-zero-marginal-interest costs of i_1 . Therefore, this supply-side policy will have different effects on students facing different demand-side constraints. Students who are relatively more advantaged in the market for investment in higher education will increase their investment, while those students who are not from advantaged family backgrounds, do not have high ability endowments, and did not attend high-quality pre-college schools are less likely to find additional investment worthwhile. This analytical result is consistent with existing theory and research. Expansion in subsidized loans is certainly a possible and a popular supply-side policy. However, the subsidy value of loans has been estimated to be only one-half of the subsidy value of grants (Leslie & Brinkman, 1988; McPherson & Schapiro, 1991), and research demonstrates that students' enrollment decisions are more responsive to grant aid than to loan aid (Heller, 1997).

Measuring the Effectiveness of Educational Policies

As the phrase implies, “policy analysis” focuses on how to determine the effectiveness of specific educational policies. This work involves using theory to draw inferences about the likely effect of an educational policy on decision makers, as

described in the previous sections, as well as using inferential methods to test whether specific policies led to the changes that were predicted by theory. This is a crucial part of policy work to economists because an ineffective policy is a wasted opportunity to apply fixed resources to their most highly valued use. Policy makers are always faced with constrained resources that limit the range of things that they can do to help improve education. Accordingly, if a policy was implemented that proved to be ineffective, then the resources could have been used in a more constructive manner and therefore an education stakeholder (students, parents, society) experience losses. It is imperative that educators and policy makers find ways to evaluate the likely impact of their policies when making decisions about them, either prior to or after implementation.

Conceptual models such as those described above are indispensable to economists for conducting this type of work. These models enable researchers to make estimates regarding how specific policies will affect the behavior of the decision maker. Economists refer to these conjectures as comparative statics. The strength of economic analysis and the use of models lies not in their ability to explain how the decision makers arrived at the present equilibrium, but rather in their ability to predict how a change in some facet of the model might affect the equilibrium. Many of these changes can be framed in terms of educational policies. For example, economic models are useful for predicting how an increase in financial aid would affect the number of students choosing to go on to college. The educational policy in this example is to increase financial aid for students, and the theoretical model would show the predicted impact of this policy on the likelihood of targeted students choosing to go to college.

The cornerstone of policy analysis, however, involves finding ways to document whether a specific policy has proven to be effective. This usually takes the form of quantitative studies that look for evidence of relationships between the policy and the actions of the decision maker. A conceptual model serves as a guide to the researcher of the possible factors that should be relevant for inclusion in the quantitative analysis. In the earlier example where policy makers were interested in increasing the rate at which black students go to college, for example, a researcher might conduct a quantitative study to determine if differences across students in their family income level or financial aid affect whether or not they go to college. Thus, the theoretical model of college-going behavior would be useful in identifying the variables that should be used in such a study. Researchers would then have a theoretical basis for focusing on these factors to determine if and how they affect a student's interest in going to college.

There is also a direct connection between comparative statics and the research methods used by economists for educational policy analysis. Multiple regression models and their counterparts such as logistic regression and hierarchical linear modeling (HLM) typically estimate models of the form:

$$Y = X\beta + P\alpha + \varepsilon \quad (\text{Equation 5})$$

where

Y = dependent variable of interest

X = set of control variables that the theoretical model suggest might have an impact on Y with weights β

P = policy-related variables that are recommended by the theoretical model with weights α , and

ε = random error term.

The policy variables could be either direct measures of whether the policy was enacted ($P = 1$ if yes, $P = 0$ otherwise), or indirect measures of the policy such as the family income level or amount of higher education spending. The estimated coefficients for the variables in X and P are referred to as partial effects because they show the predicted change in the dependent variable due to a one-unit change in the explanatory variable, holding all other variables constant. Of course, this is precisely what is meant by the notion of comparative statics. Viewed in this way, the estimates for the coefficients (α) can be used to test the theoretical predictions of the effects of specific educational policies on decision makers.

Although the model and description of the approach to educational policy analysis seems straightforward, there are a number of challenges that researchers face when attempting to analyze specific policies. First, researchers always encounter data limitations in their work. These limitations may mean that several key variables that are predicted from the theoretical model to be important for the study cannot be measured. For example, a researcher who is studying the effects of income subsidies on how students make decisions about whether to go to college may have information on family income but not family wealth. Data limitations may also affect the way in which specific factors can be measured and used in an analysis. Surveys of students may, for instance, collect data on family income in groups such as less than \$20,000, \$20,000 but under \$40,000, and so on, and financial aid data on students may be aggregated by purpose (need-based, merit-based). Likewise, the sampling design used in the analysis will impact the surveyed population and hence the degree to which the results can be applied to other settings.

Second, it should be acknowledged that the findings from quantitative studies are probabilistic in nature rather than definitive. This is due to the reliance on drawing samples from larger populations and using the results from the samples to draw inferences about what would have been found had the entire population been examined. This sampling error is inevitable in quantitative studies and is the reason why researchers use predefined significance levels when drawing conclusions about the effects of policies on the actions of decision makers. Data limitations impose yet another source of error into quantitative studies.

Summary and Discussion

In this chapter, we provided an overview of the way in which economists approach the analysis and evaluation of educational policies, and a more complete explanation of how this works with regard to the problem of access to higher education. The focus on using constraints to alter the behavior of decision makers is drawn

from the emphasis on comparative statics in economics and the use of policy levers that provide policy makers with tools that are reliable and testable. At the same time, we point out that educational policy analysts can also draw from other disciplines to target policies on the way that decision makers form preferences. With regard to access to higher education, for example, informing students of the potential benefits and costs of pursuing a higher education should always be an important component of an overall strategy to raise the college-going rate of students. However, these policies are best informed by disciplines such as sociology, psychology, and others that can yield insights into how preferences are formed. This highlights the fact that the solutions to many important policy problems in higher education require a multidisciplinary approach, and economics can make a valuable contribution to research and policy analysis in higher education through its unique theoretical and empirical perspectives on policy problems.

The wide range of entities that are involved with educational policy certainly add to the difficulty of making policies that are effective and efficient in their use of resources. Proposed policies will often be critiqued by students, parents, teachers, administrators, taxpayers, town officials, and state/local politicians, to name a few. To economists, each of these entities have objectives or goals that they are trying to reach, and will consider the likely impact of a policy on how it affects the achievement of their goals. Often policies are not Pareto optimal—i.e., socially efficient—because a policy may benefit one group and harm another. For example, increases in state appropriations to public institutions certainly benefit those students and their families who attend in-state public institutions, but they take funding away from other state uses or from taxpayers if state taxes are raised to increase the appropriations. State appropriations do constitute a potentially effective policy lever. However, because such subsidies are given to institutions and not to students, it is uncertain how much of the appropriations will be used to actually reduce the price charged to students. There are also political considerations to almost any policy proposal, whether they are for elected officials or governing boards of institutions of higher education. These instances highlight the importance of having good, empirically-based information about the likely impacts of educational policies so that deliberations can be more productive.

One area of research that promises to grow in importance with regard to educational policy analysis is the problem of *self-selection* in educational policy studies. There are many instances in education where policies such as financial aid or postsecondary encouragement programs are not implemented in a random fashion across decision makers. If decision makers are allowed to choose whether or not they are subjected to an educational policy, and this policy is affected by unobservable characteristics of the decision maker, then the estimated effect of the program will be biased using standard statistical approaches such as regression analysis. The federal government has become a strong advocate for the use of randomized experiments (the so-called “gold standard” for educational research) where a group of subjects are randomly assigned to a specific treatment (policy) and their outcomes are compared to subjects who were not assigned to the treatment (US Department of Education, 2003). The emphasis on randomized experiments in funding decisions

for federal grants has led to concerns among educators who point out that it is very difficult in many situations in education to implement a true randomized experiment. Analysts are therefore often forced to try to infer unbiased effects of policies using data that were generated without a random assignment. A number of approaches have emerged for accomplishing this, including instrumental variables (Heckman, 1979, 1990; Card, 1995), regression discontinuity (Battistin & Rettore, 2002; Hahn et al., 2001), propensity score matching (Heckman et al., 1998; Dehejia & Wahba, 2002), and natural experiments. Each of these approaches has its advantages and disadvantages, and whether one can be applied to a given policy depends on the nature of the policy and the information available to the analyst. This promises to be a topic of growing importance in educational policy analysis as researchers struggle to find better ways of evaluating the true impacts of alternative policies and meet federal requirements for the use of more rigorous research methodologies.

Conclusion

It is a common, but understandable, mistake for individuals who are not trained in economics to associate economics with money, business, profit and related phenomena, and to equate economics with fields of study such as business, finance, or accounting. However, this perspective substantially limits an individual's impression of the usefulness of economics for higher education policy analysis. In this chapter we have tried to explain and illustrate—using diagrams, detailed narration, and minimal mathematical notation—how economists analyze the behavior of individuals, groups and institutions engaged in decision-making processes by identifying the decision makers, considering the goals of the decision makers, and examining the constraints that the decision makers face in pursuit of their preferred goals. Because of its focus on the behavior of individuals, groups and institutions, economics is appropriately viewed as a social and behavioral science (Paulsen & Toutkoushian, 2006b; Toutkoushian & Paulsen, 2006). For example, many higher education policies influence individual behavior by affecting the constraints that student decision-makers face—such as income constraints, information constraints, and time constraints—as they pursue their goals. In this context, economics provides analytical frameworks that are particularly useful for understanding, evaluating, and measuring the effectiveness of higher education policies.

In the first half of this chapter, we explained how economists develop and utilize generalizable models of decision making to analyze higher education policies. In the second half of the chapter, we provided a detailed explanation and illustration of how human capital theory—the most widely-used theoretical framework from the economics of education—and a model of the market for investment in higher education can be and have been applied to the analysis of higher education policies in the policy problem area of student access to postsecondary education. We hope that, in combination, these two major parts of our chapter will serve as a useful introduction to economics for higher education scholars, administrators, and other

practitioners who are not trained in economics, but would like to understand how certain theoretical frameworks and models from the discipline of economics can be effectively used to analyze higher education policy.

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Rankings and Classifications in Higher Education: A European Perspective

Marijk van der Wende

Introduction

With the massification of higher education both the number of students and the number of higher education institutions has grown. Institutions are required to serve not only a larger but also an increasingly diverse clientele. With the concept of the knowledge economy, an even wider range of expectations of the functions and missions of higher education institutions emerged, in relation to their contribution to regional development, innovation and more generally to economic growth. In order for higher education systems to respond effectively to these trends, it is generally argued that more diversity in higher education systems is needed (Birnbaum, 1983; van Vught, 1996). Increasingly, however, these trends are taking place in the context of globalization which leads to fiercer competition for human and financial resources across the borders of nations and continents. As a result, rather than horizontal diversification a tendency towards vertical stratification can be observed. This is fuelled by global university rankings, which cement the notion of a world university competition or market capable of being arranged in a single “league table” for comparative purposes, while giving even more impetus to intra-national and international competitive pressures in the sector.

This chapter will review the dilemmas, trends and promises of university rankings and in particular their impact on institutional behavior, on system-level diversity and their relation to systems for the classification of different types of higher education institutions. This will be discussed with a special focus on the European context, in which trends to convergence and to diversification can be observed at the same time.

It will be argued that rankings only make sense within defined groups of comparable institutions, in other words that classification is a prerequisite for sensible rankings. Without this only the comprehensive research intensive university can prevail as a global winner, which will have an adverse affect on diversity since academic and mission drift (isomorphism) can be expected to intensify as a result of a single global status model. Instead, higher education institutions should be stimulated and enabled to excel in different missions and to develop distinct profiles. This requires multi-dimensional approaches to ranking and classification and the development of more sophisticated indicators for measuring performance in areas

other than basic research, such as teaching, lifelong learning, knowledge transfer, applied research, innovation, local and regional engagement, and others.

Some Background to the European Context: Patterns of Convergence and Divergence

The European higher education landscape is highly diverse. In terms of its size, the European Higher Education Area (including the 45 Bologna signatory countries) is comparable to that of the United States' higher education system. There are 3,300 higher education establishments in the European Union and approximately 4,000 in Europe as a whole (EC, 2003). At the same time, however, the European higher education landscape is far more complex than US higher education as it is primarily organized at national and regional levels, each with their own legislative conditions, cultural and historical frames, and a vast array of different languages in which the various forms, types and missions of higher education institutions may be expressed (van Vught et al., 2005, p. 4).

With the creation of the European Higher Education Area major efforts are underway to enhance the convergence between higher education systems in the different countries, the Bologna Process being the main vehicle to achieve this. The Bologna Process, initiated in 1999, represents the totality of commitments freely taken by each signatory country (initially, 29 nations; since 2005, 45 nations) to reform its own higher education system in order to create overall convergence at the European level, as a way to enhance intra-European mobility, employability and international/global competitiveness. The achievements of the Bologna Process have been substantial and influential. The initial focus was on changing degree structures into a two-cycle (undergraduate-graduate) system, and the wider implementation of ECTS (European Credit Transfer System) with the aim of enhancing the readability and recognition of degrees. This has extended to the development of a European Qualifications Framework, the description and "tuning" of competencies and learning outcomes at curriculum level, substantial initiatives in the areas of quality assurance and accreditation and work on the "third cycle", that is, the reform of studies at the doctoral/Ph.D. level (Huisman & van der Wende, 2004; van der Wende, 2007).

A series of bi-annual studies have demonstrated that the implementation of the two-cycle degree structure was established in almost all countries by 2005, although in various modes and at a varying speed of introduction (Reichert & Tauch, 2005). Despite such achievements as the convergence of degree structures and the introduction of common frameworks for quality assurance and for qualifications, certain tensions between harmonization and diversity have continued. In-depth studies and comparisons between countries show that the actual implementation of the new structures can vary significantly. Lub et al. (2003) found substantial differences between the Netherlands, where the new two-cycle system replaced the existing

long first-cycle degree system and Germany, where the new system was implemented in parallel to the existing system and despite quick growth in the number of new degree programs, only a small fraction of the total student population actually participates in these programs. Alesi et al. (2005) found in a comparison of six countries that there is no unified logic in the system of new degree programs. This point applies both to the breadth of the innovation—in each country different groups of subjects are excluded from the new structure, and different time-frames set for the introduction—and to the duration of the new programs. The 3 + 2-year model, a bachelor degree followed by a master degree, is the basic model; but there are many variations from this model. For example the United Kingdom is a notable exception: in that nation masters degrees mostly take one year. Likewise Witte (2006), in a comparison of England, France, the Netherlands, and Germany, found that there is variation in the degree of change following from the Bologna Process, especially when one looks at implementation. She concludes that the four countries under study weakly converged between 1998 and 2004 in the direction of the English system, but although the changes leading to that convergence all occurred within the framework of the Bologna Process, this does not necessarily mean that they were caused by it. Rather, the Bologna Process has often served to enable, sustain and amplify developments that have been driven by deeper underlying forces or particular interests and preferences at the national level; for example to the pressures to reduce study length, the time within which a student must complete a degree or drop out.

Apart from the fact that the Bologna Process is implemented quite differently *across* countries, weakening its harmonizing or converging effects; parallel to it, divergent trends can be observed. This is especially the case *within* countries. Examples are Germany and France, where there is increased diversity in each case. This is partly due to the parallel existence of different degree structures in the transition phase, but also derives from the increased curricular autonomy of higher education institutions (Witte, 2006). In a number of countries, among the trends in governmental policies are increased autonomy and a push for more diversity in the system. This is especially the case in countries that aim to enhance participation in higher education; for example the United Kingdom, Sweden, Finland and the Netherlands, where participation targets of 50% have been formulated. More diversity is seen as a necessary condition to achieving these aims.

At the same time, convergence occurs as both academic and professionally oriented higher education institutions now offer bachelor and master programs. There are frequent and increasing instances of functional overlap. This convergence of the two main types of higher education may lead to a change in those nations with such binary systems. But again, in response to this situation, nations also exhibit diversity and an overall trend towards a unitary system cannot be confirmed. In Hungary it has been decided to abolish the binary system and to replace it with a more varied range of programs, especially at Master's level. In contrast, the Netherlands intends to maintain the binary system and wants more institutional types to emerge within that framework. In Finland and Austria, binary systems were established only over

the last decade. The United Kingdom, which abolished its binary system in the early 1990s, is now looking to re-establish more diversity with the above-mentioned aim of thereby enhancing participation. As in other countries which have a unitary system, such as Australia, the lack of differentiation between institutions, with resulting mission convergence and institutional isomorphism, is seen as a justification for new reforms (Scott, 2004; Moses, 2004). In the case of the UK this is leading to a new search for effective forms of diversity, including a renewed focus on the teaching mission of higher education institutions, as is for example expressed in the UK White Paper on Higher Education (DfES, 2004).

The European Commission also advocates increased diversity, as a condition for excellence and increased access. Insufficient diversification, the tendency of promoting uniformity and egalitarianism, is seen as a bottleneck for including a wider range of learners and for achieving world-class excellence (EC, 2005, pp. 3–4). In terms of governance arrangements and regulatory frameworks, diversity is as important as autonomy in order to achieve wider access and higher quality (p. 7). Awareness that this implies a break with deeply-rooted notions and traditions in Europe is expressed as follows:

European universities have for long modeled themselves along the lines of some major models, particularly the ideal model of the university envisaged nearly two centuries ago by Alexander von Humboldt, in his reform of the German university, which sets research at the heart of the university and indeed makes it the basis of teaching. Today the trend is away from these models and towards greater differentiation (EC, 2003, pp. 5–6).

This message is no longer denied by the sector itself:

It is evident that the European university system needs to broaden access on a more equitable basis, that it has to reach out to increased excellence and that it must allow for more diversification within the system. The American university system is [...] elitist at the top, and democratic at the base; the European university system seems to be neither (EUA President, 2006).

The above-described trends raise questions about the level at which diversity is defined and pursued, and whether it is systemic, institutional, or programmatic diversity (Birnbaum, 1983). A more contemporary point is that “there has been a gradual shift in the meaning of *diversity*—from diversity among national systems of higher education to a European-wide diversification in institutions and programmes with different profiles” (Hackl, 2001, p. 20). At this level the questions are whether and how diversification can lead to an effective division of labor in Europe; whether cooperation or rather a competition-based process would be the most appropriate way to achieve this; and how individual countries will balance such a division of labor at European level with their national priorities. A Delphi-based study on the future European higher education and research landscape (CHEPS, 2005) shows a strong belief among actors in the field that the division of labor will imply research-intensive doctoral-granting institutions will become concentrated in the North-west of Europe. All scenarios presented in the study are consistent in this respect, which raises crucial questions on the involvement of countries in other parts of Europe. Although mobility and networking could engage individual

researchers from these countries, consequences for national capacity and linguistic and cultural diversity could still be serious.

An important distinction needs to be made between changes at the undergraduate and the graduate levels. Increasing participation rates require diversity to be enhanced especially at the undergraduate level, thereby enabling especially non-traditional students to enroll. In terms of programmatic diversity, the introduction of the associate or foundation degree, awarded after two years higher education, is important here. At the graduate level, where the patterns of activity are closely related to research strengths, there is a trend towards greater concentration and specialization.

These various trends indicate that the current dynamics in European higher education are at one and the same time characterized by trends of convergence, aiming for harmonization; and divergence, searching for more diversity. In understanding this, the distinctions between different levels of education (undergraduate and graduate/research) and the different types of diversity (institutional and programmatic) are important. Ironically perhaps, both kinds of trend—convergence and diversification—have been instigated in order to enhance competitiveness in the global context. Higher participation rates among a larger number of domestic students, fostered by diversity of provision, are seen to enhance the potential of each country as a knowledge economy. Allowing more cross-border mobility within Europe, and to attracting more students from other regions, objectives fostered by harmonization and convergence, are seen to enhance the performance of the European knowledge economy as a whole. At the same time, this implies patterns that to an extent are confusing, and it raises questions about the further direction of the process of Europeanization in higher education. Given that multi-level actions and interactions are involved, these questions are not easy to answer, and future directions are not easy to predict. The aforementioned study on the future of European higher education (CHEPS, 2005) indicates that more diversity is indeed expected, but presents quite different scenarios with respect to its consequences. They may range from a centrally organized diversity, the transparency of which would be based on the Bologna logic and primarily ensured by a single European quality assurance (accreditation) system; through great variation existing in more hybrid and networked structures, but still ensured by European frameworks for quality assurance (accreditation); to a truly anarchic or unclassifiable diversity, leading to public concern regarding quality of provision. As noted, though supra-national frameworks may enable developments at national levels, and perceptions of the international context may support national policy changes; actual national preferences and implementation modes and options may differ from nation to nation. Combined with the trend towards increasing institutional autonomy and the search for more diversity, this may be the reason why many actors are expecting an increase in vertical differentiation with respect to quality and reputation, despite efforts to achieve convergence and harmonization. This expectation, and the trends and policies in favor of autonomy and diversity, have prompted initiatives to introduce systems for classification (typologies) and ranking within Europe, discussed in Sections “Alternative Approaches to Ranking: Best Practice from Europe” and “Toward a Typology of Higher Education Institutions in Europe”.

European Responses to University Rankings and Global Competition

Expectations regarding an increase in vertical differentiation with respect to quality and reputation are further fuelled by the emergence of global university rankings. The most globally influential global rankings are those prepared by the Shanghai Jiao Tong University, first issued in 2003. The second set of global rankings, prepared by *The Times Higher*, was first published in 2004. These rankings were intuitively plausible because they confirmed the reputations of the leading American and British universities, the household names such as Harvard, Stanford, Yale, Berkeley, MIT, Cambridge and Oxford. With global university rankings, especially the global ranking of research performance, higher education itself has entered an era of open global competition between nations and between individual higher education institutions as global actors in their own right. Increasingly, national higher education systems and higher education institutions are judged by where they stand in global terms. Across the world national policy makers and higher education institutions must take account of a global higher education environment in which resources and educational status are distributed unequally.

The global rankings immediately secured great prominence in higher education, policy and public arenas; and have already had discernable effects on institutional and policy behavior. While there has been some disquiet about the impact of the rankings, and instances of critique of the methods (particularly in institutions and nations where performance was less good than expected), there have so far been only few concerted efforts to discredit the rankings process. Notwithstanding their controversial nature and methodological shortcomings rankings have become widespread and are clearly here to stay. Given this, research universities know that they must succeed within the terms of the measures. In institutions the rankings have generated a strong drive to improve position, particularly in the Shanghai Jiao Tong rankings which are seen as the more credible. Within national systems, the rankings have prompted desires for high ranking research universities both as a symbol of national achievement and prestige and as an engine of economic growth. There has been a growing emphasis on strategies of institutional stratification and concentration of research resources, some of which pre-dated the rankings. At the same time global rankings have stimulated global competition for leading researchers and the best younger talent. All of these responses have both cemented the role of the rankings themselves and further intensified competitive pressures (Marginson & van der Wende, 2007a).

In Europe global university rankings are having a serious impact. The number of European universities in the top of these rankings is disappointing in the eyes of many. In the 2006 Shanghai Jiao Tong ranking only 2 European universities (Cambridge and Oxford) appear in the top 20, compared to 17 US institutions and 1 Japanese. There are 34 European institutions in the top 100 of the list (SJTUIHE, 2007). The *Times Higher* listing is the more plural of the two, with “only” 12 American universities in the top 20 rather than the 17 in the Shanghai Jiao Tong

University table, 4 UK universities rather than 2, and universities from four other nations (France, Japan, China and Australia) rather than the one (Japan) in the Jiao Tong listing (Times Higher, 2006).

In Europe the weak representation of European higher education in the two global ranking systems coincides with wider concerns over Europe's competitive position as a knowledge economy; as compared to that of the US in particular, but increasingly also with a view to the emerging strengths of Asian countries, in particular China. With its aim to become the world's leading knowledge economy, the European Union is concerned about its performance in the knowledge sector, in particular in research, (higher) education and innovation (the so-called *knowledge triangle*). It aims to solve the *European paradox*, whereby Europe has the necessary knowledge and research, but fails to transfer this into innovation and enhanced productivity and economic growth. Indicators that tell the story, besides the position of European universities in the global rankings, are the fact that the share of European Nobel prize winners has declined throughout the twentieth century, that brain drain to the US continues, that investments in higher education and research lag behind those in the US and Japan. There are also lags in the level of higher education qualifications among the EU working-age population, and the number of researchers in the labor force. EU universities hold few registered patents, the US attracts more R&D expenditure from EU companies than US companies allocate to the EU, and China may soon be spending the same percentage of GDP on R&D as the EU.

The European performance in global rankings has prompted policy reflection and action in both EU and national government circles and is often cited in public proposals for greater investment in the European higher education and research area, and proposals for the further concentration of funding in networks and centers of excellence. Responses to growing global competition, in which knowledge is a prime factor for economic growth, are increasingly shaping policies and setting the agenda for the future of European higher education. At the EU level, the Lisbon Strategy is the main vehicle for enhancing performance of the higher education sector. Its aim are to increase funding for R&D to 3% of GDP and funding of higher education to 2%; to enhance the number of graduates overall and in particular in math, science and technology; to reduce brain drain; and to strengthen the contribution of higher education and research to innovation and economic growth. Recent budget allocations include a total (seven year) budget of 50.5 billion Euro for the EU's seventh Framework Program for R&D, which is twice the financial volume of its predecessor (FP6); and the establishment of the European Research Council (ERC), set up to fund innovative, ground-breaking basic research, with a 7.5 billion Euro budget for seven years. Another major, but also slightly more controversial, initiative concerns the establishment of a European Institute of Technology (EIT), which is meant to become a global player and is often seen as a European equivalent of the US Massachusetts Institute of Technology (MIT).

At national level, various initiatives are underway to enhance global competitiveness by concentrating resources and providing extra investments. Notable examples are the creation of top universities in Germany, to be achieved through nationwide competition among universities to identify the best research universities. These will be provided with extra funding to become elite institutions able to

compete on a global level. Three universities were selected in the first round, together with various clusters of excellence, mostly in science and engineering areas. Denmark has engaged in a merger process in order to create fewer, larger and stronger universities. In this case, motivations for the merger operation were related to the challenges of increased global competition and the desire to create world-class universities. In the Netherlands the three technical universities are joining forces in a national federation (3TU).

At institutional level, interesting examples include the establishment of LERU (the League of European Research Universities), which is particularly concerned with the question how to ensure that more European universities can join Oxford and Cambridge (both members of LERU) at the top of the world university rankings. The merger in 2004 of UMIST and the Victoria University of Manchester created the UK's largest single-site university, the University of Manchester. The stated purpose of the merger was to become one of the top 25 research universities in the world by 2015.

The examples presented above illustrate responses in Europe to global competition and clearly indicate the important role that global rankings of universities are playing (see also van der Wende, 2007). Despite the fact that European higher education does not have a long standing tradition of league tables as in the US, and that global rankings were met with some skepticism and critique, politicians in various countries now set targets as to how many universities should be listed in the worldwide top 20, 25, or 50. University leaders express their ambitions also by referring to this kind of ordering. It is increasingly realized that just stating "we are world class" or "we are a top international university" is no longer enough. Ranking data must confirm it. Moreover, it is clear that there will be strong policy pressure to ensure that the additional investments in higher education and R&D provided as part of the Lisbon Strategy and the various national endeavors will be located in successful institutions that have demonstrated their capacity to generate high dividends on the investment. This favors the systematic use of rankings and other kinds of comparison as a guide to policy.

The Dilemmas of Rankings: Limitations and Methodological Issues

Yet as rankings have a great impact on policy makers at all levels and seem to be here to stay, they are far from problem-free. Major concerns are related to their methodological underpinnings and to their policy impact on stratification and diversification of mission. Regardless of the particular methods, most rankings systems share common limitations. Common problems are that most rankings systems purport to evaluate universities as a whole denying the fact that they are internally differentiated, that the weightings used to construct composite indexes covering different aspects of quality or performance may be of arbitrary character, and that they are biased in favor of research (especially in the natural and medical sciences) with little (or no) guidance on the quality of teaching.

These various issues will now be discussed in more detail (see also Marginson & van der Wende, 2007a, b).

First, although rankings share broad principles and approaches, they differ considerably in detail related to their methodologies, criteria, reliability, and validity. Different rankings systems are driven by different purposes (Dill & Soo, 2005). They are associated with different notions of what constitutes university quality, which may be measured by a variety of indicators, depending on the perspective of the ranking's creators. This suggests that there is no commonly accepted static definition of quality that would fit all institutions, regardless of type and mission, and a single, objective ranking cannot exist (Van Dyke, 2005; Rocki, 2005; Brown, 2006; Marginson, 2006; Salmi & Saroyan, 2006; Usher & Savino, 2007).

Second, higher education institutions have different goals and missions and are internally differentiated. This suggests that it is invalid to measure and compare individual higher education institutions as a whole; and still less to compare them in a national system on a holistic basis, let alone across national and regional borders. Holistic institutional rankings norm one kind of higher education institution with one set of institutional qualities and purposes, and in doing so strengthen its authority at the expense of all other kinds of institution and all other qualities and purposes. It might be argued that the comprehensive research university is the only kind of institution sufficiently widespread throughout the world to underpin a single comparison, and the science disciplines are common to these institutions. However the Jiao Tong rankings not only norm comprehensive research universities, their blueprint is a particular kind of science-strong university in the Anglo-American tradition.

Further, there are no cross-national measures of the performance of vocational education systems or institutions equivalent to the ranking measures for research universities. Yet many vocational institutions have international networks, status and reputation, such as business schools, schools for performing arts, and hotel schools. While in most nations vocational education commands lesser status than research-based universities, the German *Fachhochschulen* (vocational technical universities), relatively well resourced and with almost equivalent status to academic universities plus links to industry, are in high international standing. Similar comments can be made about vocational provision in Finland, Switzerland and especially the *Grandes Écoles* in France.

Third, holistic institutional rankings are a fallacy in that they lead to methodological anomalies. It is dubious to combine different purposes and the corresponding data using arbitrary weightings. The weightings vary across rankings and typically reflect the view of the publisher rather than being theoretically grounded. There is general consensus that this arbitrary and subjective element is a fundamental flaw in the methodology of rankings (Salmi & Saroyan, 2006). *The Times Higher* is more a holistic ranking rather than one limited to research, whereas the Shanghai Jiao Tong group argues that the only data sufficiently reliable for the purpose of ranking are broadly available and internationally comparable data of measurable research performance (Liu & Cheng, 2005, p. 133). Despite the fact that the latter does not constitute a holistic comparison of universities, it has been widely interpreted

as such. Composite approaches muddy the waters and undermine validity. The links between purpose, data and numbers are lost. Usher and Savino (2007) remark on the arbitrary character of the weightings used to construct composite indexes covering different aspects of quality or performance. "The fact that there may be other legitimate indicators or combinations of indicators is usually passed over in silence. To the reader, the author's judgment is in effect final" (p. 3). Frequently rankings foster holistic judgments about institutions that are not strictly mandated by the data used to compile the rankings and the methods used to standardize and weight the data. In these circumstances rankings become highly simplistic when treated as summative. Nevertheless, rankings are often treated in this way.

Another flaw in rankings can be the continual changes in methodology. Although institutions may not actually change in a significant way, ratings can fluctuate year-to-year as rankers change the weight assigned to different indicators (Salmi & Saroyan, 2006; IHEP, 2007). Another common problem is that institutions are rank ordered even where differences in the data are not statistically significant.

Fourth, a recurring difficulty is that few rankings focus on teaching and learning and none have been able to generate data based on measures of the value added during the educational process (Dill & Soo, 2005, p. 503, 505); though data in these areas would be most useful for prospective students. As Altbach (2006) states, "there are, in fact, no widely accepted methods for measuring teaching quality, and assessing the impact of education on students is so far an unexplored area as well" (p. 2).

The Shanghai Jiao Tong group considers it impossible to compare teaching and learning worldwide "owing to the huge differences between universities and the large variety of countries, and because of the technical difficulties inherent in obtaining internationally comparable data" (Liu & Cheng, 2005, p. 133). Indicators such as student selectivity and research performance have become proxies for quality; yet these qualities drive the reputation of a higher education institution more than they drive its educational program. In the Times Higher ranking 20% of the index is comprised by the student-staff ratio as a proxy for teaching quality. It is highly questionable whether teaching quality can be adequately assessed using a resource quantity indicator such as student-staff ratios only. Further, there is no necessary connection whatsoever between the quality of teaching and learning, and the quantity and quality of research (let alone the level of student selectivity). Dill and Soo (2005) remark that "empirical research ... suggests that the correlation between research productivity and undergraduate instruction is very small and teaching and research appear to be more or less independent activities" (p. 507).

When criteria such as research and student selectivity are adopted as the base of holistic rankings of institutions for market purposes, the terms of inter-institutional competition are being defined by credentialism but not the formative role of higher education, as if students' only concern is the status of their degrees not what they learn. However, US and UK research suggests that only certain potential students are interested primarily in the prestige ranking of higher education institutions; and interestingly, these students tend to be drawn disproportionately from high achieving and socially advantaged groups (Dill & Soo, 2005, p. 513). Also Clarke (2007) finds that students with higher income and/or high achieving students are the most

likely to use rankings. It is as if those students who expect to participate and to succeed in higher education are primarily interested in their status position within the sector, whereas others such as those from first generation higher education families might be more conscious of the absolute benefits of participation, and rather less focused on the map of relative advantage within the sector. This area would benefit from further research, conducted on a comparative basis.

Most interesting in this respect is the new OECD project looking into the feasibility of assessing learning outcomes across institutions on an international comparative basis. It is recognized that learning outcomes are an important component of the quality of higher education institutions, in particular the value added by institutions, taking into account the quality of prior schooling and the degree of selectivity. Provided that the methodological challenges related to the measurement of value added can be overcome, these data could allow students to make better informed choices and provide institutions and policy makers with a better understanding of their comparative strengths and weaknesses in this area. It would in particular enhance the reputation of institutions that pride themselves on the value they create for their students, many of whom may enter higher education with modest entry qualifications.

Fifth, it is unclear to what extent the prestige fostered by rankings is grounded in real differences in higher education institution's quality; whether ranking feeds into a process of continuous improvement in quality and student servicing or not; and whether there are downsides of rankings from the point of view of students, higher education institutions, systems, or the public interest. Although it can be argued that a league of world-class universities needs to exist in order to counteract the rising "sea of mediocrity" in higher education (undemanding study programs, overcrowded lecture halls, poor libraries, and so on), with such institutions serving as role models (Sadlac & Liu, 2007), the evidence that strong institutions inspire better performance is so far mainly found in the area of research rather than that of teaching. In the US, over the years higher education institutions have learned to target their behavior to maximize their position on national rankings. This has had perverse effects from the public interest viewpoint, for example the manipulation of student entry to maximize student scores and refusal rates, and the growth of merit-based student aid at the expense of needs-based aid (Kirp, 2004). Clarke's (2007) findings confirm that access may be threatened by rankings, contributing to the stratification of the US higher education system and, in turn, encouraging such institutional policies as recruiting students who will maintain or enhance their positions in the rankings, early admission decisions, merit aid, and tuition discounting. UK research confirmed a strong correlation between ranking position and the relative admission quality of students (Roberts & Thompson, 2007). Studies in the US also found high correlations between a university's league table position and its income per student (Brown, 2006), although more so from state funding sources than from tuition (NBER, 2007).

Sixth, reputational surveys not only favor universities already well known regardless of merit, degenerating into "popularity contests" (Altbach, 2006); they are open to the charge that they simply recycle and augment existing reputation

(Guarino et al., 2005, p. 149), or reinforce stereotypes and market stratification (Roberts & Thompson, 2007). “Raters have been found to be largely unfamiliar with as many as one third of the programs they are asked to rate” (Brooks, 2005, p. 7). Well known university brands generate halo effects. For example one American survey of students ranked Princeton in the top ten law schools in the country, but Princeton did not have a law school (Frank & Cook, 1995, p. 149). Moreover, regardless of the particular selection of qualities measured, any system of holistic national global rankings tends to function as a reputation maker that entrenches competition for prestige as a principal aspect of the sector and generates circular reputational effects that tend to reproduce the pre-given hierarchy. The SJTU and *Times* rankings both tend to reproduce and to exacerbate the existing vertical differences in the higher education landscape.

While reputational survey data might be an indicator of competitive market position it is invalid to mix these subjective data with objective data such as resources or research outputs. The *Times Higher* fails to make this distinction. At the same time, a number of observations can be made with respect to the relation between reputation and performance. Reputation is not necessarily the same as past performance, as institutions with an established reputation are remarkably strong in maintaining their position, simply as this provides them with the cumulative advantage to attract the best people and thus further reinforce their research performance (CWTS, 2007). Williams and Van Dyke (2007) find that if reputation within a particular discipline is measured by peer opinion then it is highly correlated with a range of research measures and with an overall measure of performance comprising determinants of international standing. This correlation points to the important role of peer review as the principal procedure of assessing research performance. However, the object to be evaluated should have a size that is comparable to the usual working environment of the peer. Therefore, it is questionable whether all the individual academics involved in such large-scale surveys can be regarded as knowledgeable experts in all those parts of the evaluated entities, that is complete universities. It is even more questionable to assume that they would have detailed knowledge of universities in other countries (Dill & Soo, 2005; CWTS, 2007) and are aware of all important recent breakthroughs in specialized fields (Van Raan, 2007).

The *Times Higher* rankings are open to further methodological criticisms. The surveys are non-transparent with respect to who was surveyed or what questions were asked. Moreover, the main survey of academic peers secured only a one per cent response rate in 2006 and the pool of responses was strongly weighted in favor of the UK, Australia and South East Asia (Marginson, 2007; Van Raan, 2007). Interesting new endeavors in this respect are the 2007 Shanghai Jiao Tong rankings by subject field (SJTUIHE, 2007) and the new Leiden rankings, in which scale (size of the institution), impact (citations per publication) and field are taken into account. In this way a size-independent, field-normalized average impact indicator (the so-called “crown indicator”) has been constructed (CWTS, 2007).

Seventh, research rankings tend to be biased towards the natural and medical sciences and the English language. The model global university is English-

speaking and science-oriented (Marginson, 2006). A major part of the Shanghai Jiao Tong ranking is determined by publication and citation performance: 20% citation in leading journals; 20% articles in *Science* and *Nature*; and 20% the number of Thomson/ISI 'HiCi' researchers on the basis of citation performance. This tends to favor universities particularly strong in the sciences, as the assumption that important scientists publish their findings vigorously in international peer reviewed journals holds less for engineering, social and behavioral sciences, and even less for the humanities. Furthermore, in peer-based analyses the problem is to find adequate coverage of scientists in the relevant social sciences and humanities fields because of the many different schools of thought in these fields (Van Raan, 2007). Also citation practices differ. In engineering and applied sciences the number of citations per publication is considerably lower than in, for instance, the medical fields (CWTS, 2007). Such indicators also favor universities from English language nations, because English is the language of research. Recent work on bibliometrical analyses confirms that impact value depends upon whether publications written in languages other than English, particularly French and German, are included or not. Generally the impact of non-English publications is very low. These publications count on the output side, but they contribute very little, if at all, on the impact side (CWTS, 2007).

Since citation indices heavily rely on publications in English, the facility with which academics can disseminate research results in English becomes a critical factor in enhancing institutional reputation. This obviously puts institutions from nations whose first language is English in an advantageous position (Marginson, 2006; Salmi & Saroyan, 2006). Altbach (2006) adds that this effect is enhanced in favor of particular universities from the large US system because Americans mainly cite other Americans and ignore scholarship from other countries more than do academics elsewhere. He concludes that:

The fact is that essentially all of the measures used to assess quality and construct rankings enhance the stature of the large universities in the major English-speaking centres of science and scholarship and especially the United States and the United Kingdom (Altbach, 2006, p. 3).

The Impact of Rankings on Institutional and Governmental Policies

An international survey, supported by OECD's program on Institutional Management of Higher Education (IMHE) and the International Association of Universities (IAU), has looked into the impact of rankings on institutional and academic behavior, specifically on institutional decision-making and perceptions of government policy-making (Hazelkorn, 2007). Over 70% of the respondents were from institutions that are ranked nationally and over 40% were from institutions that are ranked internationally.

Interestingly, 40% of the respondents were not happy with their current institutional ranking, and 72% and 61% respectively want to improve their national or international ranking. Altogether 57% think the impact of rankings has been broadly positive on their institution's reputation, aided their publicity and consequently positively impacting on attracting students, followed closely by forming academic partnerships, collaboration, program development and staff morale. Almost half, 46%, of the responding institutions have a formal internal mechanism for reviewing their rank. Of these a majority have taken either strategic or academic decisions in response. These results confirm that institutional leaders are taking rankings very seriously, incorporating the outcomes into their strategic planning mechanisms. Mostly they are using the results to identify weaknesses, and develop better management information tools to control the relevant indicators, but sometimes also reorganizing the institution or even hiring more Nobel Prize winners. Respondents were also asked to what extent they believe that rankings influence policy decision by governments. In general they stated that rankings have had an impact beyond their original purpose, impacting on a wide range of issues, such as the allocation of funding, in particular of research grants. A majority of respondents also indicated that they think that rankings favor the well-established universities, and emphasize research and postgraduate strengths. In doing so, they contribute to hierarchy rather than to more institutional diversity. Finally, the respondents stated that they were in favor of rankings carried out by independent research organizations or accreditation agencies, NGO's or international organizations, rather than by media or commercial organizations.

Rankings, Stratification, and System-Level Diversity

The fact that rankings favor the well-established universities, emphasizing their research strengths, thus contributing to hierarchy rather than to diversity, has been argued before and in particularly in relation to global rankings (Marginson & van der Wende, 2007a). In fact, certain countries see rankings and the subsequent stratification as means to assist in creating 'world class' universities and thus meet increasing global competition (Clarke, 2007). The policy impact of global rankings tends to be distinct as global comparisons are possible only in relation to one model of institution, that of the comprehensive research-intensive university. This model is the only one sufficiently widespread throughout the world to lend itself to the formation of a single competition, which, as noted, for the most part is tailored to science-strong and English-speaking universities. Research is not only the most globalized of all activities in higher education, research capacity is a key marker in the higher education landscape because the research standing of higher education institutions and nations feeds into both their capacity to produce globally-salient outputs and their generic attractiveness to other institutions, to prospective students and to economic capital.

Global rankings favor research-intensive universities at the cost of excluding excellent institutions that are for instance primarily undergraduate institutes, such as for instance liberal arts colleges. Salmi and Saroyan (2006) argue that the higher

regard for research institutions arises from the academy's own stance toward research and teaching; and note that this suggests the need to carry out the daunting task of developing objective and reliable metrics that can be accepted universally for assessing the quality of teaching.

The extended and intensified competition fostered by global rankings and their echoes at regional and national level has a number of secular effects with inevitable consequences, unless these effects are modified by policy intervention. Such measures seem particularly necessary to avoid a situation where some higher education institutions build research strength only through the weakening of others, which would seem to constitute little gain in national capacity overall. Rather than just creating more world-class (research) universities, what is needed also are more world-class technical institutions, world-class community colleges, world-class colleges of agriculture, world-class teaching colleges and world-class regional state universities, as Birnbaum (2007) argues. In this context it is important to realize that a "world class university" is expensive. It is estimated that the threshold cost to support such establishments is around 1.5 billion US dollars per year and 2 billion in cases where the university also includes a medical faculty and a university hospital. From this perspective it is estimated that Europe could host at most between 30 and 50 world class universities (Sadlac & Liu, 2007). Van Raan (2007) finds that the group of outstanding large broad research universities would not be larger than 200 members worldwide. He argues that there may be more smaller universities with excellence in research, but that there is no room for further "powerhouses of science" because no more excellent scientists are available worldwide.

As rankings systems reinforce the status of the comprehensive research intensive university model, there is no reason to assume that competition in itself will generate specialization unless the incentive structure favors this. A certain flattening of national system typologies results so as more unitary systems may be the result. In addition, certain conjunctural developments favor a drift towards homogeneity: the trend to institutional autonomy in many nations provides some higher education institutions with greater freedom in determining their mission according to market logic. Every university seeks to lift its rankings and many are prepared to change priorities in order to achieve this. In Europe for instance some polytechnics might seek to reshape themselves to fit the new common program structure secure. This draws attention to the importance of policy measures to sustain existing typologies or to develop new ones as required (see below). Furthermore, intensified competition on the basis of research performance will exacerbate demand for high quality scientific labor, with likely effects also on mobility and price. There already appears to be an increase in the mobility of ISI-defined HiCi researchers though this has yet to be subject to detailed empirical investigation. Thus one likely outcome of the intensified global competition and its mediation by rankings is to increase the stratification of research labor and the academic profession(s) both within national labor markets and between global and national labor markets. The instrumental importance of HiCi and other productive researchers in composing the Jiao Tong index strongly suggests that the global element in labor markets will grow in importance, though by how much is difficult to judge.

In this context van Vught (2006a) is concerned about the potential for simplistic market-type competition strategies in relation to the social dimension of higher education. He argues that the introduction through public policy of increased competition does not necessarily lead to more responsiveness of higher education institutions to the needs of the knowledge society. Rather than being driven by a competition for consumer needs, higher education institutions are driven by a competition for institutional reputation. In addition, the creation of more institutional autonomy in such a “reputation race” leads to costs explosions, related to hiring the best faculty and attracting the most talented students; to institutional hierarchies; and to social stratification of the student body. Along the same lines a Rand Corporation study shows how as institutions develop in size, range and market power they increasingly seek prestige, rather than the satisfaction of student or funder needs, as their principle objective. Other institutions then attempt to meet those needs but they are handicapped by their lack of prestige. The net result is that the system as a whole is less responsive, less diverse and less innovative than it would otherwise be (Brown, 2006). Considering the influence of ranking on higher education opportunity, US actors suggest this should be part of a wider debate on whether a more market-based system of higher education is changing institutional behavior in desirable ways (Clarke, 2007).

Policy should strive to correct the perverse effects arising from league tables, and to advance horizontal institutional diversity and informed student choice using typologies and customised rankings.

Alternative Approaches to Ranking: Best Practice from Europe

A better approach to rankings begins from the recognition that all rankings are partial in coverage and contain biases, and that all rankings are purpose-driven. It is valid to engage in rankings provided they are tailored to specific and transparent purposes (and only interpreted in the light of those), and customized to the needs of different stakeholders. The definition of quality in the context of tertiary education implies that the education meets the aspirations of students, the expectations of society, the demands of governments, business, and industry, and the standards set by professional associations (Salmi & Saroyan, 2006). At the same time, the different purposes and their corresponding data should not be combined using arbitrary weightings. Summarizing the overall ranking of an institution in one single score makes it difficult for students to distinguish among institutions based on the characteristics they find most important (IHEP, 2007). Because “quality is in the eye of the beholder”, rankings should be interactive for users, particularly students. Users should be able to interrogate the data on institutional performance using their own chosen criteria. It is necessary to adapt the definition of quality to the interests, learning approaches and circumstances of ever increasing numbers and types of students—no one size fits all. What each student wants to know is not which is the best university, but which is the best university course for her/him. As students are primarily interested in

choosing a course of study, by definition institutional rankings can only provide a proxy for this, at best.

In Europe the Centre for Higher Education Development (CHE) in Germany has developed an alternative that is better than other ranking systems. The chief strategic virtue of the CHE rankings, one with far-reaching implications for the character of competition in higher education, is that it dispenses with a spurious holistic (overall or summative) rank ordering of higher education institutions, and instead provides a great range of indicator data in specific areas, including single disciplines collected from individual departments. As CHE states, there is no “one best university” across all areas, and “minimal differences produced by random fluctuations may be misinterpreted as real differences” in holistic rankings systems. The CHE data are presented on a website through an interactive web-enabled database that permits each student to examine and rank their chosen institutions based on their own chosen criteria, that is, to choose their own weighting scheme (CHE, 2006).

The CHE ranking focuses on selected academic subjects (36) offered by a substantial number of universities, which are updated in clusters within a three-year cycle. Even within a single subject, the CHE ranking does not calculate an overall value out of single, weighted indicators, as there is in their view neither a theoretical nor an empirical basis to do so. In relation to the students (mainly new entrants) who are the main target group, the CHE insists that the heterogeneity of their preferences has to be taken into consideration (for instance, whether they are interested in high research activity, intensive teaching, or other themes). Calculating an overall score would patronize them and would obscure the different profiles of universities, with their specific strengths and weaknesses. Hence the CHE ranking is multidimensional by ranking each indicator separately and leaving the decision about their relevance to the user. The CHE ranking does not give individual ranking positions as, in statistical terms, such a procedure ignores the existence of standard errors. Instead the CHE ranking orders universities per area or theme in three groups: top, bottom and intermediate (Müller-Böling & Federkeil, 2007).

The CHE system is internationally acknowledged as best practice in higher education rankings (Usher & Savino, 2007; Van Dyke, 2005; Salmi & Saroyan, 2006). The system complies with the Berlin Principles on Ranking (UNESCO/IHEP, 2006) as developed by the International Ranking Expert Group (IREG) founded by the UNESCO European Centre for Higher Education (UNESCO-CEPES) in Bucharest and the Institute for Higher Education Policy (IHEP) in Washington. In the context of the Bologna Process, CHE decided to internationalize its ranking, besides data on higher education institutions in Germany, it now also includes Switzerland and Austria, and the Netherlands and Belgium (Flanders) are preparing to join the system.¹ The CHE ranking system is thus well positioned to develop into a European-wide system.

¹A project coordinated by the Center for Higher Education Policy Studies (CHEPS) at the University of Twente in the Netherlands and the Centre for Higher Education Development (CHE), with support from the European Commission.

Toward a Typology of Higher Education Institutions in Europe

In the face of the normalizing effects of holistic rankings another policy means of sustaining diversity is to systematize or strengthen institutional classifications or typologies. Moves of this kind to encourage horizontal institutional diversity have recently emerged in Europe, following long-standing experiences in the US. As described above, the European Higher Education Area is large and highly complex. At the same time diversity is seen as important in order to widen access and improve quality. Policy measures to counterbalance mission drift and consequent convergence are therefore particularly important for Europe. Moreover, in order to make diversity useful it needs to be made transparent and well understood. In this context a basic policy requirement in Europe is the development of a typology of higher education institutions, by publicly defining the missions and characters of higher education institutions. In order to encourage institutions to design different missions and profiles, allowing them to excel in a variety of domains, to ensure transparency for stakeholders, and to provide a basis for diversified policy making.

At present such a typology (classification) of higher education institutions in Europe is being developed (van Vught et al., 2005),² which would employ a multi-classification approach while making the heterogeneous higher education landscape more transparent. It aims to contribute to a better understanding of the various types of institutions, their different missions, characteristics and provisions, which will support mobility, inter-institutional cooperation and the recognition of degrees, hence the international competitiveness and attractiveness of European higher education (the Bologna aim, see Section “Some Background to the European Context: Patterns of Convergence and Divergence”). The proposed multi-scheme typology acknowledges that institutions can be grouped and compared in a variety of ways. The heart of the typology will be formed by the various characteristics upon which differences and similarities of institutions are mapped, each highlighting a different aspect of the profile of the institution. In this way, the typology will be made up of a number of parallel schemes, each based on a different characteristic. Schemes would focus on education (for example types of degrees delivered, range of subjects offered), on research and innovation, student and staff profile, size and legal status of the institution, and so on. The project’s first experiences seem to suggest that data to measure the various indicators are more available for certain schemes than for others and that the level of sophistication of indicators may vary, as well as the extent to which they can be compared across Europe. For instance, whereas indicators for basic research are based on quite well-developed bibliometrical data, indicators for the socio-economic relevance of (applied) research are still in development and more work would also need to be done with respect to teaching, lifelong learning, knowledge transfer, innovation, local and regional engagement, and other areas. Various major efforts at EU level to collect more

² A project coordinated by CHEPS in cooperation with a wide range of stakeholders and with support from the European Commission.

systematic data in these areas, in particular those in the context of the Lisbon Strategy and the connected Open Method of Coordination, will positively feed into the process of developing this typology further.

The preliminary work on this European typology was carried out in conjunction with a review of the US Carnegie Classification of higher education institutions, including the reasons for and principles of its revision in 2005, when the old single classification system was replaced by multiple parallel classifications, in order to optimize the information-producing advantages of classification while minimizing the downside, its potential to be used as a ranking mechanism (Sapp & McCormick, 2006). Also in the European case, this is the main rationale for taking a multi-dimensional approach; stimulating and enabling higher education institutions to excel in different missions and to develop distinct profiles in a variety of dimensions rather than in one dominant area.

Conclusions and Implications

Through the Bologna Process, Europe is working hard to enhance convergence and transparency in higher education structures at program level, including degree systems, credit transfer and quality assurance. At the same time, more diversity is necessary in order to address the increasingly diversified demand of a growing and more diverse student population and of labor markets and society. Clearly, the integration of higher education systems in Europe did not solve problems of academic and vocational drift and has not (yet) well addressed the needs for lifelong learning, world-class research, and post-doctoral training. Hence the need to address more explicitly the diversity of institutional profiles (van Damme, 2006). Both kinds of trends—convergence and diversification—are needed to enhance the performance of the European knowledge economy and its competitiveness in the global context, this is, to allow more cross-border mobility within Europe, to attract more students from other regions, and to widen access and improve quality.

The various methodological problems of global rankings, the fact that they favor one particular type of institution, the research-intensive university, over all other types of institutions, in granting it global status, and the impact of this phenomenon on institutional and governmental policy making, strongly suggest the need for more differentiated, multi-dimensional approaches. The CHE ranking developed in Germany provides the best and already internationally recognized alternative in this respect. It has various methodologies virtues, complies with the Berlin Principles on Ranking, provides excellent information for students taking the heterogeneity of their preferences into account, and avoids perverse effects on mission drift and student entry. Initiatives are underway to extend this system to a Europe scale.

If it is absolutely necessary to rank institutions, care must be exercised to compare similar institutions. This means going beyond looking at institutions that are similar in name and making sure that they are also similar in mission, organization and program focus. Consequently, classification systems (typologies) are a

precondition for ranking. Both should be multi-dimensional. Classifications should enable and in fact stimulate higher education institutions to develop distinct institutional profiles and to excel in a variety of domains rather than in one dominant area (van Vught, 2006b). The European project on developing a typology for higher education institutions is taking exactly this approach, aiming to create a multi-dimensional space, or a legitimate space for sub-systems where institutional missions can be better realized. The intention is to ensure that competition is more productive; that it is not based on confusion, leading to mission drift and reputation race, but instead based on genuine responsiveness to educational, social, and economic demand. In this way it is hoped that typology and comparison will make a contribution to overcoming the “European knowledge paradox”.

The development of more and better indicators for areas other than basic research is a precondition for the proposed multi-dimensional approaches. Reliable metrics are now only available for research, although mainly measured through peer reviewed journal articles. Indicators for the impact and relevance of research are still in development and work on indicators for innovation, knowledge transfer, lifelong learning, local and regional engagement also need extra efforts. But most needed is the development of objective, reliable, and generally acceptable measures to assess the quality of teaching. Comparing institutions internationally on this dimension could counterbalance the uneven statuses of research and teaching. The present primacy of research may reflect the academy’s own stance toward both functions, but it is has certainly been enhanced by the current global rankings with their strong research bias.

Europe is clearly making progress on the diversity agenda, yet many further questions and challenges remain. For classifications in particular: even multi-dimensional approaches may drive specific missions more than others (as some lenses or dimensions may still be dominant) and a certain hierarchy may be unavoidable. Thus, dynamic flexibility (the possibility of being able to change position) is important. How can this be ensured in line with institutional development and can ossification be avoided? For both ranking and classification: how can ownership of the sector and the role (potential behavior) and involvement of stakeholders best be taken into account in order to avoid self-fulfilling prophecies (van Vught, 2006b)? How will the different initiatives in Europe correspond to those in US and Asia? How can global transparency in this respect be developed and how can global balance be ensured?

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Institutional Transformation and the Advancement of Women Faculty: The Case of Academic Science and Engineering

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Introduction

The participation, status, and advancement of women in academic science and engineering have been pressing social concerns in the United States, particularly over the past 25 years. The concern is rooted in two basic sets of issues: the provision of human resources for the science and engineering workforce, and social equity in access to and rewards for professional participation in these fields.

As human resources, women are important to the size, creativity, and diversity of the scientific and engineering workforce, broadly (Hanson, 1996; Pearson & Fechter, 1994). Women faculty, specifically, contribute to the culture and climate of the university and the development of students' capacities and potential in science and engineering—with potential consequences for future generations of scientists and engineers. The percentages of women faculty are positively associated with percentages of women students who are undergraduate majors in mathematical sciences (Sharpe & Sonnert, 1999), majors in science and engineering (Canes & Rosen, 1995), and majors and recipients of bachelor's degrees in life sciences, physical sciences, and engineering (Sonnert et al., 2007). This provides empirical support for the long-standing discussion about women faculty as “role models” for undergraduate women in scientific (and other) fields (Astin & Sax, 1996; Hackett et al., 1989; Stake & Noonan, 1983; Xie & Shauman, 1997).

In graduate education in science and engineering, women faculty are consequential because of whom they train and the ways in which they do so. In a survey of 1,215 faculty in doctoral granting departments in five science and engineering fields, women faculty reported acting as primary research advisors for a larger number of women graduate students than did men, and also had larger number of women students on their research teams. Further, women faculty put significantly more emphasis upon giving help to advisees across areas, not only in designing, executing, and publishing research but also in gaining social capacities, including participating in laboratory meetings, making presentations, and interacting with faculty (Fox, 2003a).

The status and advancement of women faculty in science and engineering is a pressing, national issue also because of related concerns of social equity (or inequity)

in access to participation, and rewards gained, in science. This connects to an idealized “ethos of science,” articulated over 60 years ago by Robert Merton (1942/ 1973), prescribing that scientists should be rewarded for contributions, with their “careers open to talent” and characteristics as race and gender, irrelevant for making claims and gaining rewards.¹ This system of belief continues to underlie the appeal for public support of science and helps justify the federal investment in science—although status and rewards in scientific employment do not accrue independently of gender, as discussed in this chapter and documented in a considerable stream of research (see reviews in Long & Fox, 1995; Sonnert & Holton, 1995; Zuckerman et al., 1991).

Women in academic science and engineering are a highly accomplished group who have already survived series of selection—both their own self-selection into scientific fields and selection by educational institutions. They have moved through the proverbial educational pipeline. They have completed doctoral degrees and have credentials for professional work. Yet the highest career attainments tend to elude this socially selective group. Across US four-year colleges and universities in 2003, women were still less than 10% of the full professors in mathematics, statistics, and physical sciences, and less than 5% of those at full rank in engineering. Life sciences have a higher proportion of women faculty, but even in these fields, women remain under 20% of the full professors (CPST, 2006: Table 4-50).

These relatively low proportions at full professorial rank—the rank associated with highest level of influence and decision-making in academia—exist despite the increase in women’s share of doctoral degrees in scientific fields, and the passage of time for women to mature in professional years and experience. In life sciences, the proportion of doctoral degrees awarded to women rose from 18% in the decade of the 1970s, to 29% in the 1980s, and 38% in the 1990s (CPST, 2006: Table 3-27). In the mathematical, physical, and environmental sciences, women’s proportions of doctoral degrees are lower than in life sciences; but across these fields, women’s share of doctoral degrees was 8% in the 1970s, 15% in the 1980s, and 21% in the 1990s (CPST, 2006: calculated from Table 3-27).

These patterns raise issues about the nature of the problem of women’s relatively slow and low attainment of full rank, and the solutions that may be applied to improve the advancement of women faculty in academic science and engineering. This chapter addresses these issues by:

1. Presenting a rationale for scientific fields, particularly, as a critical research site for understanding both gender and status, and higher education in the United States

¹This ethos maintains that science is governed by “universalistic” norms—that is, norms and standards that operate apart from characteristics of persons (race, gender, national origin). The universalism is contrasted with “particularism,” relations governed by “particular properties” of persons (Merton, 1942/ 1973). Science has been characterized both as an institution in which universalism operates and one in which universalistic standards fall short (see Cole, 1992, pp. 157–176; Mitroff, 1974; and Mulkay, 1976 for reviews of the debate). Whether inequality in science is *equitable* or *inequitable* depends upon the extent to which it may be explained by normatively justifiable criteria, generally merit- or achievement-based standards (see Long & Fox, 1995).

2. Summarizing perspectives on women's stalled advancement in academic science, and implications for solutions taken
3. Addressing "institutional transformation," as a concept in the study of higher education, broadly, and as an organized initiative of the National Science Foundation ADVANCE program
4. In conclusion, considering both the prospects for, and limits upon, institutional transformation as a strategy for the advancement of women in academic science and engineering.

Science as a Focal Research Site in the Study of Gender and Higher Education

In the study of gender and status, scientific fields are a focal research site.² This is because of the hierarchical nature of gendered relations, generally, and because of the hierarchy of science, particularly. Relations of gender are hierarchical because women and men are not social groups that are categorized—and distinguished from each other—neutrally. Rather, women and men are differentially ranked and evaluated, usually according to masculine norms or valued standards. Science, in turn, is fundamentally hierarchical. Gender relations are reflected in and also reinforced by participation and status in science. Because science is a powerful institution, it mirrors and expands gender stratification. Science is a critical and powerful social institution in the following key ways.

First, science is an agent of power, with consequences for the present and future human condition (see also Cockburn, 1985; Wajcman, 1991). Grounded in abstract and systematic theory and rationality, science is a prototype of professional claim to "authoritative knowledge" (Fox & Braxton, 1994, p. 374). Science defines what is "taken for granted" in daily lives and activities by literally billions of people (Cozzens & Woodhouse, 1995, p. 551). To be in control of science is to be involved in directing the future, and this is highly valued (Wajcman, 1991, p. 144).

Second, science connects with mighty institutions, especially education and the state. Mathematics, integral to science, operates as a key filter subject in progression to continuing educational levels, as Latin once operated as a filter

²Science comprises the eight classifications of the National Science Foundation/National Research Council: physical, mathematical, computer, environmental, life, and engineering, as well as the psychological and social sciences. In this chapter, sciences refer primarily to the first six of these fields, excluding psychology and social sciences—which are, in turn, the focus of the NSF ADVANCE initiative, analyzed subsequently. In this chapter, the short-hand term, "science" or "scientific fields" is sometimes used; and at other times, the term, "science and engineering" is used. The framework presented here on gender, science, and higher education draws from, and is discussed in more detail in Fox, 1999.

subject, when the church controlled education. By the eighteenth century, the church had lost its dominance over education, and Latin began to give way, initially to philosophy and logic, and then to science and mathematics as prominent subjects. Science and mathematics began to function as “proofs of competence” and a means of upward social and occupational mobility, based upon meritocratic performance (see Artz, 1966, pp. 66–67; Hacker, 1989, pp. 60–66; Noble, 1977, pp. 20–32; Schneider, 1981). In the process, mathematics and quantitative tests (standardized admissions tests [SAT] and graduate record exams [GRE], for examples) came to serve as important filters in continuing educational progression (Hacker, 1990, p. 141).

As with education, a strong connection exists between science and the political order, pointing to science as an agent of power. The root is this: science costs, and the government finances. The state, in turn, has a strong stake in science. Science is supported largely through public funds, distributed through federal agencies. Under the “social contract for science”—an arrangement originally outlined by Vannevar Bush in 1945—the federal government provides funds for basic research and scientific training, and agrees not to interfere with scientific decision-making, in exchange for unspecified benefits to the public good expected to result ultimately from science. In practice, however, scientific research is shaped by the interests of both scientists and the federal sponsors and funders of science. The shaping of scientific research by sponsors and by public and congressional constituencies is manifest in areas such as oceanography, funded by the Office of Naval Research, and “the war on cancer” and research attention to AIDS and to Alzheimer’s disease, funded by National Institutes of Health. Particularly telling of the relationship between science and the state is that scientific products and research achievements have been taken as gauges of national resourcefulness, power, and prestige. Scientific progress is considered to be in “the national interest.”

Third, and in keeping with its hierarchical features, science is marked by immense inequality in status and rewards (Zuckerman, 1988, pp. 526–527), and values ascribed to science, such as rationality and control, have been more ascribed to men than to women (Keller, 1985, 1995). As stated earlier, science is a focal and strategic site for the study of gender because it both reflects and reinforces the hierarchical relations of gender. In academic science, this gender stratification is manifest in women’s compared to men’s greater concentration in four year and two year colleges (compared to universities and medical schools), location in lower academic ranks, lower publication productivity, and lower salaries (see Cole, 1979; Fox, 1999, 2001; Long, 2001; Long et al., 1993; Long & Fox, 1995; Reskin, 1978a; Sonnert & Holton, 1995; Ward & Grant, 1996; Xie & Shauman, 2003). In this chapter, the focus is upon rank and advancement in rank, as key dimensions of the status of academic women in science and engineering.

Finally and importantly, science is critical to the study of higher education because science has shaped the development of the modern, complex university. In order to understand higher education, and in turn, faculty within higher education, one needs to understand science, as depicted in the following section.

Science and Higher Education: Reciprocal Developments in the United States

In the United States, science and higher education have evolved as “reciprocal developments.” Science played a major role in transforming the college of the early nineteenth century into the modern university, and science may be regarded still as a force shaping the characteristics of the university. The reciprocal effects of science and academia have been in at least three areas.³

First, from the mid-nineteenth century onward, science was a force breaking up the generalist, classical curriculum of the old college tradition, which, based largely upon religion, prepared young men for the ministry, law, or leadership positions in government service. In the mid-nineteenth century, two events consequential to science and higher education occurred in the US: the passage of the Morrill Land-Grant Act and the establishment of experimental stations for agricultural research.

The Morrill Act, first introduced to Congress in 1857 and re-introduced, passed by Congress and signed into law by President Lincoln in 1862, provided to states grants of federal land to use for the founding of colleges devoted to agriculture and mechanical arts. This “infusion of land and capital” (Montgomery, 1994, p. 113) established state colleges, which later became universities, throughout the nation. In ushering this bill into law, Representative Justin Morrill of Maine raised a political specter of “national competitiveness” that would be heard time and again throughout the following, twentieth century—the threat of Russian dominance in education: “[in Russia] we find a despotism . . . placing it within the power of her agriculturalists and artisans to become educated and skillful, while our people with government in their own hands, parley to the brink, and do nothing for their own benefit” (quoted in Wolfle, 1972, p. 52).

In the same year (1862) that the Morrill Act was passed, the federal Department of Agriculture was founded, and agricultural experimental stations, under the direction of the newly established state colleges, boosted scientific research through the study of agricultural problems—soils, crops, fermentation, and entomology. The stations increased public support for the state colleges and universities by working on issues of political and economic concern to the states, but the stations also undertook basic research in genetics, physiology, and other life sciences (Wolfle, 1972, p. 56).

These developments helped shepherd into US higher education specialized curriculum, lectures, seminars, and independent work. Eventually, this new education largely replaced the traditional, classical education of canonical literature and philosophy, and pedagogy emphasizing drill and recitation (Fallon, 1980; Montgomery, 1994; Wolfle, 1972).

Second, sciences paved the way for graduate education across fields. The first doctorate awarded in America was in science from the Sheffield School of Scientific Study of

³This analysis of the “reciprocal developments” of science and higher education draws in part from Fox, 1996.

Yale in 1861. In the next 20 years, 14 of 20 (that is, 70%) doctorates awarded in the United States were in scientific fields (Wolfe, 1972, p. 89). In the process, the generalist “natural scientist” gave way to botanists, zoologists, and geologists, and “natural philosophy” to chemistry and physics. This had consequences for specialization and graduate education, and for hiring based upon specialized qualifications (Wolfe, 1972, p. 87). As graduate work spread to other fields, the proportion of doctoral degrees awarded in science fields declined, although the sheer number of science degrees increased. Between 1911 and 1945, the physical and natural sciences accounted for 45% of doctorates awarded (Wolfe, 1972, p. 89). Additionally, the first post-doctoral appointments in the US, established by the Rockefeller Foundation and the National Research Council in 1919, were limited to mathematics, physics, and chemistry. In the first dozen years of these post-doctoral programs, 80% of those who completed these fellowships took academic appointments at US universities (Geiger, 1993, pp. 248–249).

In like manner, sciences led the way in securing federal support for research and training. This partnership of higher education and the federal government began in agricultural colleges, spread to other scientific fields, and filtered down throughout the university. The “filtering” was not passive flow. Scientists did not merely set a pattern adopted by other (nonscientific) fields; rather, they played leading roles in establishing the pace, including holding important positions in the development of federal agencies for the arts and humanities. The pattern was to create a line of development in science and extend it to psychology, the social sciences, humanities, and then the arts (Wolfe, 1972, p. 91).

Third, with specialization, federal support for research, and winning of autonomy in research,⁴ forces largely related to developments of science, the university became decentralized, even fragmented. Power in appointments and control of research funds moved away from central administration toward departments. Such decentralization came to define the complex university which continues to dominate higher education in the United States.

None of this happened without conflict and opposition (Montgomery, 1994), and current tensions in faculty roles and the ambivalence of institutional functions in higher education reflect a history of strain between teaching and research, particularly (Fox, 1992a, pp. 301–302). However from mid-nineteenth century onward, higher education did transform from the generalist curriculum of the college tradition as described, and scientists were largely responsible for the characteristic features of the modern university. Accordingly, within higher education and for the public support underlying it, science became a model (albeit sometimes faltering) of research expertise, a standard for research training and apprenticeship, and often a continuing gauge of national economic competitiveness, military defense, and power and prestige (Montgomery, 1994).

The US model of university-based scientific research—which has continued to evolve more recently with extended ties between universities and industry

⁴Of the original (1915) council of the American Association of University Professors on Academic Freedom and Academic Tenure, seventeen of the twenty eight members were scientists or social scientists (Wolfe, 1972, p. 91).

(Dietz & Bozeman, 2005; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004)—contrasts with the greater importance that European nations have placed upon independent research institutes as central homes of science. In Germany, for example, basic and applied research is conducted in independent institutes, as well as in universities. The Max Planck Society for the advancement of science, founded in 1948, undertakes basic research, especially within “new and innovative research areas,” in natural, life, and social sciences. The Society supports 80 research institutes with a total of over 12,000 staff members, and 9,000 doctoral students, post-doctoral students, guest scientists and researchers, and student assistants as of 2007. The institutes emphasize “autonomous and independent” research carried out within the scope set by Society.⁵ Notable also are the Helmholtz Association, formed in Germany in 1958, and now constituting 15 research centers in core areas of energy, earth/atmosphere, health, transport and space; and the Fraunhofer-Gesellschaft which undertakes applied scientific research in 56 institutes in Germany, making it the largest organization for applied research in Europe.⁶

The Status and Advancement of Women Faculty in Science and Engineering: Perspectives and Connection to Institutional Transformation

In accounting for the depressed rank and advancement of women in academic science and engineering, the explanations have centered on the role of individual characteristics of the women and on the role of organizational features of the settings in which women are educated and work, constituting perspectives that may be termed “individualistic” compared to “organizational/institutional” (Cronin & Roger, 1999; Fox, 1996, 1998, 2001, 2006a; Robinson & McIlwee, 1989; Sonnert & Holton, 1995).

Individual characteristics of women play a part in explaining the status of women in academic science. But the individual characteristics do not exist in a social vacuum, and by themselves, do not explain the status of women in academic science. For example, no direct relationship has been found between measured creative ability or intelligence and research productivity among scientists (with implications, in turn, for advancement) (Andrews, 1976; Cole & Cole, 1973). Rather, organizational conditions in the workplace, such as autonomy and availability of human and material resources, are important (Damanpour, 1991; Glynn, 1996). The

⁵“Research for the Future—the Mission Statement of the Max Planck Society” is on-line at: <http://www.mpg.de/english/portal/index.html>.

⁶The History and Mission of the German Helmholtz Association is on-line at <http://www.helmholtz.de/> “Driving Force in Innovation,” the statement of the Fraunhofer-Gesellschaft, is on-line at <http://www.fraunhofer.de/fhg/EN/company/index.jsp>.

presence, compared to absence, of these conditions may enhance (or alternatively, block) the translation of individuals' creative characteristics into productive or innovative outcomes or products. In addition, although women scientists' career attainments (including rank) are lower than that of men scientists, their measured intelligence (IQ) is higher, suggesting that, intellectually, women in scientific fields are an even more selective group than men (Cole, 1979). In prestige of doctoral origins as well, women do not obtain degrees from lower-ranking institutions than do men. Both men and women scientists are as apt to have received doctoral degrees from top-ranking universities (Fox, 1995, p. 217).

Family and household statuses are individual characteristics of scientists that have received scholarly, as well as popular, attention. The conventional wisdom is that good scientists are either men with wives, or women without husbands or children (Bruer, 1984). However, the data contradicts the mythology. Although marriage has been found to affect negatively the rank and salary of academic women, the effects are significant only in the case of salary for those in research universities (Ahern & Scott, 1981). Among biochemists, marriage has been reported to have positive effect on being promoted from assistant to associate professor rank for both women and men; and for promotion to the rank of full professor, marriage had no effect (Long et al., 1993).

Further, in studies across physical, biological, and social sciences, married women have been found to publish more than women who are not married (Astin & Davis, 1985; Cole & Zuckerman, 1987; Fox, 2005; Helmreich et al., 1980; Kyvik, 1990). Moreover, among samples of academic scientists, the presence of children had either no effect on women's publication productivity (Cole & Zuckerman, 1987), a slightly, negative, nonsignificant effect (Reskin, 1978a; Long, 1990), or a positive effect (Astin & Davis, 1985; Fox, 2005; Fox & Faver, 1985).

It is important to emphasize, however, that these data do not indicate that marriage and parenthood have no effect upon academic women in science and engineering. Family circumstances can have a multitude of effects in personal sacrifices as well as rewards and extraordinary accommodations made among women scientists (Grant et al., 2000). What the data indicate is that marriage and parenthood do not negatively affect advancement in rank and publication productivity among those who hold academic positions (at the time data are collected in the studies). Family demands may take their toll along the way, through graduate school and early career, so that a proportion of women are eliminated from scientific careers and do not fall into cross-sectional data of professional, employed scientists (Long, 1987).⁷

In understanding the status and advancement of women faculty in science and engineering, it is important to look to features of the organizations in which academics

⁷Thus, as discussed subsequently, work-family practices and policies can support the participation of women in science.

are educated and work. Women's status in academic science and engineering is not a simple function of their individual characteristics, including background, aptitude, attitudes, and ability. Rather it is a consequence also of complex factors of their organizational environments—characteristics and practices of the settings in which they study and work, including evaluative practices, access to human and material resources, and patterns of inclusion and exclusion (see Fox, 1991, 1992b, 1998, 2000, 2001, 2003a, 2005, 2006a; Fox & Mohapatra, 2007; Long & McGinnis, 1981; Reskin, 1978b).

Organizational settings are important in understanding the status and advancement of men and women—across occupations. But they are especially important in fields of science. This is because scientific work is fundamentally social and organizational. It is carried out “on site” with costly space, instrumentation, and equipment; is conducted in cooperation with students and others; requires significant funding; and in short, is an interdependent enterprise. Compared to sciences, the humanities, for example, are more likely to be performed solo rather than as teamwork; to be carried out in the absence of equipment and instrumentation; to require modest funding; and to be more individually-based activities (Fox, 1991, 1992b).

More so than men, women in academic science are outside of the networks in which human and material resources circulate. In graduate education, for example, men and women are as likely to obtain degrees from prestigious universities, as indicated above. However, women and men graduate students report different experiences in their departments, in research groups, and with their advisors, encompassing matters of inclusion and exclusion, and nuances of training. Responses from a national survey of 3,300 doctoral students in five science and engineering departments indicate that women are (1) less likely to believe that they are taken seriously by faculty and respected by faculty; (2) less comfortable speaking in research team meetings; (3) less likely to report receiving help from faculty in learning to write grants proposals and publish papers; and (4) more likely to view their relationship with their advisor as one of “student-and-faculty” compared to “mentor-mentee” or “colleagues” (Fox, 2001). Such factors, in turn, suggest differential opportunities to gain significant, sustained roles in the scientific enterprise.

In keeping with this, a recent survey of all women faculty and a stratified random sample of men faculty in four colleges at Georgia Institute of Technology (Georgia Tech), a leading scientific and technological institution, points to gender differentiation in departmental work environments, as experienced by women and men faculty. Notably, women report less frequent interaction around research with faculty in their home units; 30% of men, compared to 13% of women, report speaking daily about research with faculty in their home unit (Fox, 2003b). This may be a function of access and opportunity, and socially-conditioned “preferences,” of one gender group compared to the other.

Speaking about research is an important dimension of scientific work, as it operates in departmental units. This is because face-to-face interaction with colleagues helps to generate and support research activity. Ongoing, informal discussion about research problems encountered and progress made activates interests, test ideas,

and reinforces the work (Blau, 1973; Reskin, 1978b; Pelz & Andrews, 1976). In a study of 200 research initiatives, Garvey (1979) found that less than 15% of initial ideas for papers originated from journal articles or presentations at professional meetings; rather the projects got their start from informal networks of information and discussion. Compared to formal communication, informal exchange also provides more room for speculation, retraction, and sharing of failures as well as successes. Those located outside of circles of communication, interaction, and exchange are then limited in means of testing and developing ideas (Fox, 1991).

Collaboration is central to the work of science. Most scientific research is, in fact, collaborative and the publications are coauthored. Women and men in science are as likely to coauthor their publications (Cole & Zuckerman, 1987). But the issue may be more subtle than simply the rates of collaboration and coauthorship. Even when women publish coauthored work, they may have more difficulty finding and establishing collaborators, and may have fewer collaborators available to them (and in turn, may then work with a more narrow range of persons) (Long, 1992). Accordingly, the survey of faculty at Georgia Tech indicates that women and men faculty are as likely to report that they have colleagues in their home unit who work in a research-area related to their own; but women are less likely than men to report that that the faculty are “willing” to collaborate to them (Fox, 2003b).

This leads to consideration of publication productivity. In analysis of gender, status, and advancement in science, publication productivity is important for two reasons. First publication is the central social process of science, the way in which research is communicated, verified, and archived, and the way in which scientific priority is established (Fox, 1983, 1985; Merton, 1973; Mullins, 1973). Second, until we understand productivity differences, we cannot adequately address gender differences in rank and advancement, which are related to—but not wholly explained by—publication productivity. Although the gender gap in publications has been narrowing recently in biological and social sciences, women publish less than men, especially in physical sciences (see Creamer, 1998; Long & Fox, 1995; Long, 2001; Sonnert & Holton, 1995; Ward & Grant, 1996). Women’s depressed publication productivity is both cause *and* effect of their career attainments. That is, it both reflects women’s location in lower ranks, and it partially accounts for it. “Partially” is a key term: holding constant levels of publication productivity, women’s advancement in rank remains lower than men’s. Although understanding is incomplete of the underlying processes, women are promoted at lower and slower rates, after controlling for numbers of articles published and citations to articles (Cole, 1979; Long et al., 1993; Long & Fox, 1995; Sonnert & Holton, 1995). This holds among different types of institutions, varying in levels of prestige.

For these sets of reasons, the status and advancement of women in academic science and engineering are organizational issues—and as such, they are subject to organizational transformation (Fox & Colatrella, 2006). Consequential, in turn, are the concept and meaning of “institutional transformation” and the factors that facilitate transformation of higher education institutions, addressed in the following section.

Institutional Transformation: Meaning and Facilitating Factors

Institutional “transformation” is not merely institutional “change.” Transformation involves *planned* alterations in core elements of the institution: authority, goals, decision-making, practices, and policies (Levy & Merry, 1986; Nutt & Backoff, 1997). Thus, transformation has been referred to variously as “quantum change,” “second-order change,” “large-scale change,” and “strategic reorientation” (Wischnevsky & Damanpour, 2006, p. 104).

Based upon definitions and descriptions in eighteen studies of change compared to planned transformation, Levy and Merry (1986) characterize institutional transformation as: (1) deliberate, purposeful, and explicit; (2) a “process” of alteration; (3) engaging external or internal expertise; and (4) involving a strategy of collaboration and power sharing between the experts and others (Tables 1.1–1.2, pp. 1–9). Transformation then has consequences for an institution’s purpose, goals, and directions and its functional processes in organizational structure, management and leadership, reward structures, and communication patterns (Levy & Merry, 1986).

Organizational research also emphasizes that transformation involves radical alteration not just in traditional practices or “ways of doing business,” but also “ways of thinking” that alter taken-for-granted customs, norms, and rules. Summarizing 13 studies of transformation, primarily within business-settings, Nutt and Backoff (1997) point to transformative ways of thinking that involve “visions of a desired future,” “visionary possibilities,” and coherent changes that help to specify what it means to think about clients or customers, products, services, or strategic alliances in ways that “break away from traditional thinking.”

The concept and study of institutional transformation, applied to higher education, specifically, have resulted a national project sponsored by the Kellogg Foundation and three reports, two published by the Higher Education Research Institute of the University of California-Lost Angeles (Astin & Associates, 2001; Astin & Astin, 2001), and a third report of the Kellogg Forum on Higher Education Transformation (Burkhardt, 2002). The definition and core strategies of transformation in higher education, especially as related to dimensions of organizational culture, are analyzed and published in a volume by Eckel and Kezar (2003a), and are addressed in a range of other representative articles (Eckel & Kezar, 2003b; Gioia & Thomas, 1996; Kezar & Eckel, 2002; Hearn, 1996; Neave, 2004).

Applied to higher education, transformation is characterized as change that is: (1) systemic, (2) deep, (3) intentional, and (4) cultural (Astin & Associates, 2001; Burkhardt, 2002; Eckel & Kezar, 2003a).

1. Systemic change involves alteration in the range of functioning parts of the institution. These functioning parts are connected, and change in one area/part has implications for change in other parts of the organization. The systemic parts or elements, subject to inter-connected transformation, may include, for example, fiscal policies, personnel policies and practices, faculty development, recruitment and admissions, advising, and publications (Burkhardt, 2002, p. 120). Creating systemic change is more complex than effecting an isolated change. Changes

attempted in any significant part of the institution result in stresses and tensions in connections to other parts of the institution; and unless these tensions are resolved in the connected elements, they are likely to result in resistance to change (Astin & Associates, 2001). Owing to its systemic feature, transformation is slow, challenging, and often unpredictable (Burkhardt, 2002).

2. Transformation is deep to the extent that it affects values and assumptions, as well as structures and processes in higher education. Transformation that is deep involves values and beliefs of individuals and groups, with implications for the ways that teaching, advising, research, and service are conducted by individuals and by departments and programs, more collectively. This feature of transformation is sometimes specified as both “interior” and “exterior.” “Interior” beliefs, values, and intents affect any effort of transformation in higher education. Thus, if reformers make significant changes in “exterior” programs or policies, changes in the programs and policies need to be accompanied also by changes in individuals’ and groups’ shared (“interior”) values and beliefs (Astin & Associates, 2001).
3. Transformation is intentional because it involves deliberate and purposeful decision making about institutional actions and directions. The details of such a plan will evolve over time, however, and are subject to external pressures that may come from federal, state, and/or private funding, and accrediting bodies.
4. Finally, transformation of higher education is cultural because it involves changing institutional cultures, that is, the dominant and prevailing patterns of assumptions, ideologies, and beliefs that people have about their organization and that shape their attitudes, priorities, and actions regarding teaching, research, and service (Eckel & Kezar, 2003a, pp. 27–28). Thus, an institution cannot transform without altering parts of its culture; and reciprocally, characteristics of a current institutional culture will place constraints upon the nature and extent of institutional transformation that is feasible. Further, because aspects of the culture of higher education institutions are shaped by external factors (such as the federal economy) over which “reformers” may have little control, it is unlikely that transformation will lead to a entirely “new culture” within the institution (Eckel & Kezar, 2003a, p. 27).

What, in turn, then are some of the key factors that help to facilitate transformation in higher education? First, leadership is critical because leaders shape organizational visions, send institutional signals and messages, and have power to implement change (Fox, 2006b). In academic institutions, the support of central administration is frequently indispensable for transformation because high-level administrators can make decisions, set policy, convene groups, and allocate resources in favor of transformation (for examples, see Asmar, 2004; Lindman & Tahamont, 2006).

Leaders in central administration are also well-positioned to use the institution’s stated mission and values to generate awareness and support of, and involvement in, transformation (Burkhardt, 2002, p. 132). This approach may be subtle as it is in citing the discrepancies between “stated” or “espoused” values and actual institutional policies and practices, and the way in which the transformation aims to reconcile the

two—for example, by citing discrepancies between values of broad participation and design of the curriculum, and then bringing democratic participation into the design of the work (Astin & Associates, 2001, pp. 32–33). “Motivating visions,” in turn, are potentially important because institutional transformation incurs risk and uncertainties, and a vision can provide a blue-print and compass toward something that is new, but uncertain (Eckel & Kezar, 2003a, p. 77).

The administrative role of the president and/or provost is probably indispensable at the start-up or initiation of transformation, but it may be unwise to depend indefinitely upon administrators as change-agents (Astin & Associates, 2001). Research universities (and other settings) tend to be strongly influenced by the professional and expert authority of the faculty, and this makes partnership with faculty important for the impetus and impact of upper-level, administrative decision-making (Birnbaum, 1992).

In fact, a second key facilitator of transformation is identifying stakeholders throughout an institution who may be involved in designing and implementing activities for the process of transformation. This, in turn, heightens commitment, empowerment, and engagement in the process of transformation (Eckel & Kezar, 2003a, pp. 76–77). Such involvement may be accomplished in a range of modes including retreats, seminars, symposia, and focused discussions, and through the use of newsletters, talks, taskforce reports, and email notes and announcements (Burkhardt, 2002; Eckel & Kezar, 2003a). The aim is not simply disseminating information about the initiative of change, but also obtaining feedback from members of the institutional community (Astin & Associates, 2001, p. 32).

Effective networks for institutional innovation are supported through specific means including: (1) coalitions developed among persons at various ranks within the organization who can help steer the process of change and develop commitment to change; (2) early and continuing information conveyed about the need for change and the steps to ensure change, without adverse consequences for faculty, students, and administrators; and (3) training made available for participation in institutional innovation (Daft, 2004, pp. 426–428).

Third, institutional transformation is facilitated by positive incentives that support innovative behavior and practices. An institutional reward structure can enhance transformation by reducing individuals’ risk and resistance, aligning individuals’ efforts toward transformation through positive recognition and rewards (salary, advancement) (Fox, 2006b). Institutional transformation is enhanced when the desired innovations undertaken “count” for individuals as well as for the institution at large; and when the institution’s criteria for evaluation are clear (Fox et al., 2007; Whitman & Weiss, 1982).

Fourth, transformation is enhanced by generating support outside of the institution. Toward this, a key strategy has been obtaining grants from respected agencies and foundations, which provide both material and symbolic support (Astin & Associates, 2001). External consultants and advisory boards can also provide outside credibility for the planned change, and advisory boards can offer fresh perspectives and advice, and act as a sounding board for the changes planned (Burkhardt, 2002, pp. 133–134). In addition, peer institutions engaged in similar efforts of

transformation can enhance each others' efforts by sharing resources, agreeing to implement common assessment procedures, and by having collective training and discussion sessions (Astin & Associates, 2001, p. 33).

Finally, long-term investment is key to transformation. Transformation requires focus and attention over a continuing period of time in order to implement and maintain change that is intentional, systemic, deep, and cultural. Efforts of institutional transformation often fail because leadership and incentives, and other key components for transformation, are present for a short-phase, rather than for the sustained years required (Eckel & Kezar, 2003, p. 77).

NSF ADVANCE: Initiative for Institutional Transformation for the Advancement of Women Faculty in Science and Engineering

In 2001, the National Science Foundation (NSF) released a call for proposals for a new program, called ADVANCE, with the goal to “increase the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse science and engineering workforce” (NSF program solicitation 01-69). The rationale stated for this program was that:

Pursuit of new scientific and engineering knowledge and its use in service to society requires the talent, perspectives, and insight that can only be assured by increasing diversity in the science, engineering and technological workforce. Despite advances made in the proportion of women choosing to pursue science and engineering careers, women continue to be significantly underrepresented in all science and engineering fields (NSF program solicitation 01-69, p. 3).

In this solicitation, three types of awards were announced: Fellows Awards to establish independent research careers, Leadership Awards to recognize outstanding contributions made by organizations or individuals for the increased participation and advancement of women in academic science and engineering careers, and Institutional Transformation Awards to support the increased participation and advancement of women scientists and engineers in academe. Of these, the largest investment (\$3–4 million per institution awarded) was made for the Institutional Transformation Awards—constituting a new approach within NSF funding to support advancement of women in science and engineering.⁸

How and why did NSF come to pursue institutional transformation as an award program? Created in 1950 as a federal agency awarding competitive grants for research and education in science and engineering fields, NSF has had a long-standing commitment to assure that “there will always be plenty of skilled people available to work in new and emerging scientific, engineering and technological fields, and plenty of capable teachers to educate the next generation” (NSF, 2007). In 1980, the Science and Technology Equal Opportunity Act, enacted by Congress, mandated that NSF

⁸Three solicitations for Institutional Transformation Awards followed, one in 2002 (NSF 02-121), another in 2005 (NSF 05-584), and a third in 2007 (NSF 07-582).

collect and report data on women and minorities in science and engineering. Biennial NSF reports on “women and minorities in science and engineering” (later including also “persons with disabilities”) appeared, beginning in 1982.

In the 1980s, NSF also undertook initiatives to address the underrepresentation of women through Career Advancement Awards for individual women to develop and pursue their research programs, and Visiting Professorships for Women to expose women faculty in science and engineering to research experiences and approaches outside of their home universities. The Visiting Professorships also had a component for about a third of the awardees’ time and effort to be devoted to attracting and retaining women scientists and engineers at the institutions visited. In 1996, NSF replaced the Visiting Professorships with the Professional Opportunities for Women in Research and Education to provide awards for women’s career advancement and to provide greater visibility for women scientists and engineers in academic settings. Each of these programs of the 1980s and 1990s focused upon awards made to individual women, principally for support of their research programs in science and engineering (Rosser & Lane, 2002, pp. 328–332).

In 1999, Joseph Bordogna, then Deputy Director of the NSF, convened a group called the ADVANCE Coordinating Committee, organized in response to an assessment of the impact of NSF’s programs focusing upon women in science and engineering and a concern about the continuing, significant underrepresentation of women in science and engineering, especially in high-ranked positions in academia. This working group, chaired by Alice Hogan, concluded that it would be difficult to enable the advancement of women without changing the settings in which they work. The conclusion was supported by “academic research accumulated to produce a shared understanding of gender bias’s structural and cultural underpinnings” (Sturm, 2006, p. 276). Thus, the NSF ADVANCE program was established, with Alice Hogan as the founding program director. The first solicitation, posted in 2001, pointed to “institutional information” in this way:

There is increasing recognition that the lack of women’s full participation at the senior level of academe is often a systemic consequence of academic culture. To catalyze change will transform academic environments in ways that enhance the participation and advancement of women in science and engineering, NSF seeks proposals for institutional transformation (NSF program solicitation 01-69, p. 8).

NSF Initiatives of Institutional Transformation Among the First Two Rounds of Awardees: Emphases and Range

In the first two rounds of awards (2001–06, 2002–07), institutional transformation grants were made to 19 institutions.⁹ Based upon the websites of these institutions and their annual reports to NSF (posted on the respective websites), I coded the

⁹The initiatives of the 2005 awards are not addressed in this chapter, because the awards are recent and the initiatives not yet developed and fully depicted on-line.

central initiatives undertaken in the past five to six years by each of these (19) institutions. The aim of this method is to depict the emphases and range in the initiatives involving: (1) fundamental structures (leadership, work-family arrangements, tenure and promotion); (2) faculty composition (recruitment, retention); (3) internal networks of education, communication, networking, and material resources (for faculty; for departments); (4) other internal networks; and (5) networks of external supporters (Table 1).

This is not an “evaluation” of the NSF ADVANCE initiatives; the ways and means for such an undertaking are neither available nor within the scope of this chapter. Rather, the focus here is upon the description of the patterns of the ADVANCE initiatives, and ways that they correspond to what is known about key dimensions and facilitating factors of transformation in higher education, as described in the previous section of this chapter.

The vast (84%) majority of these sites have leadership initiatives as a type of structural initiative; in fact, of all types of initiatives for transformation, those addressing leaderships are the most common (Fig. 1). In four of the institutions, leadership initiatives include ADVANCE professors or chairs. These professors participate in leadership teams for institutional transformation, bring awareness of gender equity to the campus, communicate goals of advancement within their colleges and throughout the institution, provide feedback to administrators, and also undertake their own research programs. In addition, leadership initiatives among award sites include policy, institutional action, and collaborative leadership teams, and at six institutions, explicit leadership development for senior women faculty so that they may better understand the institution and be able to foster advancement for other women.

Initiatives addressing work-family arrangements are a second set of structural initiatives (Table 1). Forty-two percent of the awardees have initiatives that seek to integrate work and family, aiming to overcome the extent to which work and family are competing spheres (Fig. 1). Specific work-family initiatives include “modified academic duties” at the time birth or adoption of a child or illness of a family member, dual-partner hiring programs, funds for release time from teaching for periods of critical transitions in life, and at in one institution, the opening of a day-care center and establishment of lactation rooms for nursing mothers (Table 1).

Although structures of promotion and tenure codes and practices are core to outcomes of advancement, initiatives that directly address promotion and tenure are exceptional, present in only four (21% of) institutions (Fig. 1). One institution has undertaken a comprehensive canvass of evaluation processes across units and a survey on tenure/promotion issues, and has introduced and implemented a set of “best practices” and developed a web-based instrument to assist users in identifying forms of bias and in promoting more fair and equitable processes of evaluation. A second institution has proposed changes in tenure and promotion of the “Faculty Code” that would include a mentoring meeting three years after tenure and promotion to rank of associate professor, and would provide an institutional ombudsperson for promotion and tenure. A third institution works with the Office of the Provost to sponsor tenure and promotion workshops each semester. The fall workshop addresses issues across-colleges. The spring workshop involves unstructured

Table 1 Initiatives of ADVANCE Institutional Transformation awardees, 2001–06 and 2002–07

Category of initiative	Initiative	Examples of initiatives
A. Fundamental structures	1. Leadership	<ul style="list-style-type: none"> - ADVANCE professors or chairs - Policy committee - Institutional action committee - Leadership workshops for faculty and administrators - Leadership retreats for administrators - Leadership development program - Leadership awards
	2. Work-Family Arrangements	<ul style="list-style-type: none"> - Day care center - “Modified” duties for child or family care - Dual partner programs and/or reports - Funds for release time for family (and other) needs
	3. Tenure and Promotion (P&T): evaluation for advancement	<ul style="list-style-type: none"> - P&T committee, including review of all P&T documents/practices, and development of web-based instrument - P&T workshops - Proposed changes in P&T code/ documents
B. Faculty composition	1. Recruitment	<ul style="list-style-type: none"> - Resources provided for “start-up” packages - Faculty “lines” provided - Advisors and/or assistants who participate in recruitment - Identifying female candidates - Tool-kit for recruitment - “Offer-letter” templates for equity - Workshops and/or training for search chairs/committees
	2. Retention	<ul style="list-style-type: none"> - Affirmative action principles outlined - Tool-kit for retention - Retention guidelines
C. Internal networks of education, communication, mentoring and resources	1. For faculty	<ul style="list-style-type: none"> - Sponsorship for research development
	(a) Faculty development	<ul style="list-style-type: none"> - Formal and informal mentoring - Career advising and coaching - Workshops on faculty development
	(b) Distribution of material resources	<ul style="list-style-type: none"> - Research funding—inc. equipment, research expenses, release time, and grad/undergrad research assistants - Funding for workshops, symposia, seminars on-campus - Funding for attendance at conferences
	2. For departments	<ul style="list-style-type: none"> - Workshops, training, and coaching in issues and best practices of equity and diversity for department chairs
	(a) Dept chair development	

(continued)

Table 1 (continued)

Category of initiative	Initiative	Examples of initiatives
		- Programs for department and chairs in “climate” and “transformations”
	(b) Distribution of material resources	- Funds provided for “departmental transformation” and “climate change”
	3. Other Internal Networks	- On-campus conferences and retreats - Symposia - Networking lunches and meetings - Internal advisory boards
D. Networks of—mechanisms for— External Supporters		- Visiting scientists as speakers and/or mentors and research advisors - External advisory boards

roundtable discussions, by college, permitting interaction with college deans and promotion and tenure committee representatives, so that faculty may bring forward their questions about promotion and tenure requirements, and strategies and practices for promotion within their college. A fourth institution has also initiated workshops on tenure and promotion, cosponsored with the Provost’s office.

The second broad category of initiatives focuses upon faculty composition—means of increasing the recruitment and retention of women faculty (Table 1). Initiatives of recruitment are common among the institutions, and are present in nearly four-fifths (79%) of the sites (Fig. 1). At two institutions, recruitment initiatives are direct, involving the provision of ADVANCE funds for hiring two to three women faculty, or commitment of a college for two new faculty lines for diversity. Initiatives at four institutions directly supplement hires with provision of ADVANCE funds to support “start-up packages” for recruitment of women faculty. Another initiative is also relatively direct, funding “equity advisors” who participate in faculty recruitment, and another initiative provides training sessions in equity for recruitment committees. Recruitment initiatives at other institutions are less direct—that is, less directly involved in the actual recruitment—and provide reports, tool-kits, templates, and guidelines with concrete suggestions for recruiting a diverse pool of applicants, workshops, or ADVANCE staff support geared to the hiring of women faculty. In contrast to recruitment, *explicit* retention initiatives are exceptional, present in two (11% of) institutions, and consist of guidelines and/or tool kits on ways to enhance faculty’s experiences and retain excellent faculty (Fig. 1).

Education, communication, and mentoring, a third broad category of initiative, are pervasive among ADVANCE institutional awardees (Table 1). One set of these initiatives, present in three quarters (74%) of the institutions, focuses upon faculty development for academic women in science and engineering (Fig. 1). Specific activities at these institutions include sponsors to enhance research programs, formal and informal

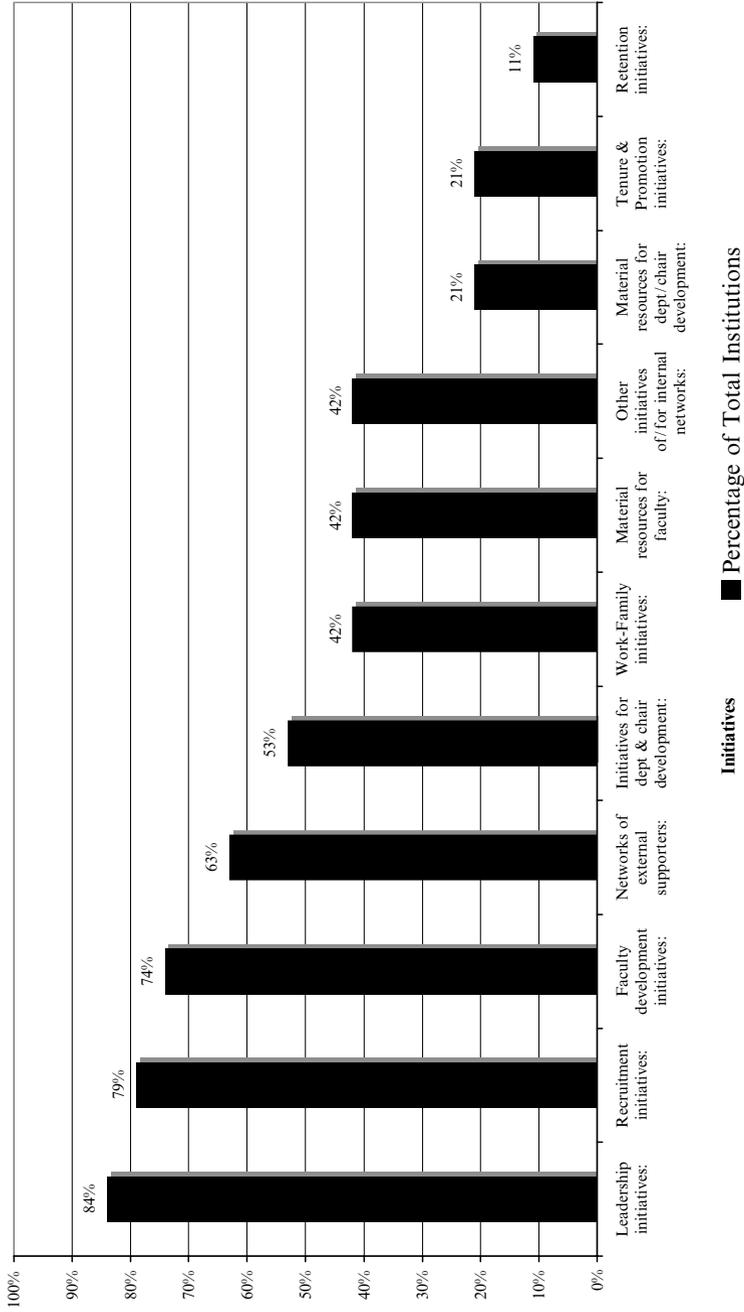


Fig. 1 Percentage of institutions undertaking types of initiatives

mentoring, coaching and advising for advancement, and a range of workshops on topics such as obtaining external funding (Table 1). Less frequent, but still present in 42% of the institutions, is material support provided through ADVANCE for women faculty's development (Fig. 1), with grants for travel and conference attendance, and for current or proposed research through funding for release time, equipment, graduate research assistants, and other research expenses (Table 1).

Another set of initiatives of education and communication focus upon chairs and departments, rather than women faculty, and are present in over half (53%) of the institutional sites (Fig. 1). The initiatives with chairs address issues of equity and inclusion (Table 1), and are represented, for example, by one institution's use of focus groups among chairs to highlight (and solve) issues of departmental climate, collaboration, and environment among colleagues. Other initiatives go beyond chairs to include faculty within the departments as well. This is represented by one institution's program with chairs, faculty members, and ADVANCE team members, to enrich communication, enhance collaboration, and seek support of faculty diversity. An initiative at a second institution works internally with departments to help ensure equity among faculty in access to resources and opportunities for success. This program uses an outside consultant to interview departmental members; and in assessment of the program, compares the "experimental group" exposed to the program to a "control group" not exposed. An initiative at a third institution, focusing upon the departmental-level, organizes workshops with small groups of chairs to increase awareness of departmental climates, identify issues of concern, and address them. In four institutions (21% of total sites), material resources in the form of "grants" or "awards," funded through ADVANCE, are provided to departments with fundable proposals to transform climates and cultures toward improved equity, inclusion, and advancement of faculty within the context of their own department.

Initiatives of education, communication, and exchange also encompass a significant range of other initiatives (Table 1), present among 42% of the sites (Fig. 1), including on-campus conferences and retreats, symposia on diversity, networking lunches and meetings, and in the case of five institutions, formal internal advisory boards.

The final broad category involves networks of—and mechanisms for—external supporters (Table 1). These are present in 63% of the ADVANCE award sites (Fig. 1). Five institutions have external advisory boards to help inform, and provide feedback on, their initiatives. Five institutions (including one that also has an external advisory board) have programs that bring visiting scientists to campus to serve as speakers and research role models. These visitors are also variously expected to provide visibility for the scientific achievements of women, establish networking opportunities, and enable potential research connections and collaborations, and mentoring relationships.

What may be the central ways in which the ADVANCE initiatives embody key dimensions and facilitating factors of transformation in higher education? Transformation of higher education has been characterized as change that is systemic, deep, intentional, and cultural, described in the previous section. The ADVANCE initiatives result from proposals for Institutional Transformation grants

made by NSF, and cooperative agreements between NSF and the institutions awarded; thus, the sets of initiatives can be characterized as “deliberate” and “intentional.” The extent to which the initiatives are systemic, involving alteration in the range of functioning institutional parts, vary. Focusing upon “recruitment” without addressing the ways, means, and functioning parts that translate “intake” into “advancement” (through, for example, patterns of research collaboration and evaluative practices) may be less systemic approaches. Development of women faculty through ways and means to research performance is systemic, or at least “institutional” compared to “individual” in its approach—to the extent that this approach focuses upon continuing access and opportunity to participation and performance of under-represented groups (compared to simply support of individuals’ research). The inclusion of work-family initiatives and structural changes in work-family practices and policies, points, on the other hand, to systemic approach in this area. Initiatives that address evaluative processes, faculty codes in tenure and promotion, and equity in departmental decision making—which, in turn, connect directly and indirectly to advancement—are yet more systemic approaches.

Nearly all of the institutions’ initiatives may be characterized as deep and as cultural. The approaches are deep to the extent that the institutions address (“internal”) values and beliefs about equity as well as aspects of (“exterior”) programs and policies, in for example, the iteration of affirmative action principles, development of best practices of equity at the departmental-level, and guidelines for retention. In their documents and websites, the initiatives display understanding that changes in programs and policies need to be accompanied by changes in values and beliefs. These values are specified variously among sites as “diversity and excellence,” “greater understanding of gender issues and how to address those issues,” “a family-friendly edge,” and “frameworks of shared vision,” for examples. Relatedly, the initiatives involve changes in institutional cultures or assumptions and beliefs that shape attitudes, priorities, and actions regarding teaching, research, and/or service. The institutions’ approaches to changes in institutional culture are manifest in a range of initiatives, such as ADVANCE advisors who participate in recruitment and raise awareness of best practices for equity; information and advice provided for search committees to promote strategies and tactics for excellent and diverse applicants, and for fair and thorough review of candidates; and a leadership program to create and sustain organizational climates and organizational structures that facilitate the recruitment, retention, and promotion of women.

Of the factors described earlier in this chapter as facilitating transformation, those employed most extensively among ADVANCE awardees are leadership, development of stakeholders and networks of communication, reward structures for transformation, and support generated outside of the institution.

First, leadership initiatives are the most pervasive ADVANCE initiatives, present in the vast (84%) majority of sites (Fig. 1), as explained above. Further, administrative leadership is present in the institutions’ structure of principal investigators and co-investigators for the ADVANCE awards. Forty-seven percent of the institutions have a principal investigator who is a president, vice chancellor, provost, or

associate provost. Forty-two percent of the institutions have at least one co-principal investigator who is a provost or vice provost; 21% have one co-principal investigator who is a dean, and 26% have more two or more co-principal investigators who are deans. Administrative leaders in these positions can send signals and messages about the importance of the transformation envisioned, convene groups, make decisions in favor of transformation, and allocate continuing resources toward transformation (beyond the ADVANCE award period, which lasts for five years). Further, for core initiatives involving tenure and promotion, the involvement of central administration is indispensable in implementing such fundamental change across academic colleges and departments.

Second, the ADVANCE initiatives are facilitated in extensive networks of stakeholders and communication with them. In each institution, administrators, chairs, and faculty, across numbers of colleges and departments, are enlisted in the ADVANCE initiatives for institutional transformation. This occurs through a range of means including: (1) on-campus, annual retreats and conferences in which goals of transformation are conveyed, and refined and updated by the academic community; (2) symposia that communicate visions of change; (3) networking lunches and meetings that heighten awareness of ADVANCE and build communities of people committed to collective goals; and (4) internal advisory boards constituted to discuss and promote practices, formulate policies, create a sense of “ownership” in the initiatives, and expand support (Table 1).

Third, reward structures are apparent explicitly in research funding for faculty through release time, travel, and undergraduate and graduate assistants, provided in some form in 42% of the institutions (Fig. 1). Reward structures for collective transformation are evident in material resources for programs of climate change and transformation for departments and chairs, provided in 21% of the institutions (Fig. 1). In addition, reward structures for recruitment of women faculty are explicit in two institutions in which ADVANCE funds support new lines for hire of women faculty, and in four institutions in which ADVANCE funds provide or supplement “start-up packages” for recruitment of women faculty in science and engineering. The connection between faculty composition and transformation depends upon how composition ultimately relates to—or affects—patterns of interaction, collaboration, and exchange that are central to the social processes, and markers of significant participation and performance, in academic science and engineering (Fox, 1991, 1996, 2001).

Finally, outside supporters, as a facilitating factor, are apparent in the external networks characteristics of over half (63%) of the ADVANCE awardees (Fig. 1), and of course, in all of the awardees, when the grant, itself, is considered as significant outside support. The external networks expand and inform support of the transformation through the infusion of “visiting professors” who are a component in five (26%) of the institutions’ initiatives, and external advisory boards, also present in 26% of the institutions. External networks also have potential for providing outside credibility, fresh perspectives, and feedback on the initiatives undertaken.

Summary and Conclusions

In summary, the participation, status, and advancement of women in science and engineering have been pressing social concerns for reasons of human resources for, and social equity in access to and rewards within, these fields. Women in academic science and engineering are a highly accomplished group—but the highest career attainments tend to elude this socially selective group. This is particularly notable in women's lower and slower advancement to the rank of full professor in academic science and engineering. The pattern of depressed rank raises questions about the nature of the problem of advancement and of solutions that may be applied.

In the study of gender and status, scientific fields are a focal case, because of the hierarchical feature of gendered relations, broadly, and because of the immense inequality in—and power of—science, particularly. Science is a medium of social power in its consequences for present and future conditions, and science connects to weighty social institutions, especially education and the state. In order to understand higher education, one needs to understand science (and vice versa). This is because in the United States, science and higher education evolved as reciprocal developments. Science played a strong role in changing the colleges of the nineteenth century into modern universities, and science still shapes the American university.

Explanations for the depressed rank and advancement of women in academic science have centered on the role of individual characteristics of women, and of organizational features of academic work and the workplace. Personal/individual characteristics play a part in explaining career outcomes in scientific fields. But individual characteristics of people do not exist in a social vacuum. Women's status in academic science is not a simple function of aptitude, attitudes, and ability. It is a consequence, more so, of complex factors of organizational context—the characteristics and practices of the settings in which they work (and in which they have been educated). The participation, status, and advancement of women in academic science are then organizational issues, and are subject to institutional transformation.

Consequential, in turn, are the meaning of institutional transformation and the factors that facilitate transformation of higher education institutions. Institutional transformation involves planned alterations in core elements of an institution, and radical change not only in traditional practices, but in ways of thinking as well. In higher education, institutional transformation has been characterized as systemic, deep, intentional, and cultural. Transformation of higher education is facilitated by leadership, networks of shared stakeholders, positive incentives for innovation, and support generated outside the institution.

In 2001, the National Science Foundation released a call for proposals for a new program “to increase the representation and advancement of women in academic science and engineering careers, thereby contributing to the development of a more diverse science and engineering workforce.” A new type of award and approach, going beyond grants to individuals, was announced: ADVANCE Institutional Transformation awards.

Analyses in this chapter of the initiatives of the first two rounds of ADVANCE Institutional Transformation awardees (2001–06 and 2002–07) point to both central tendencies and range in initiatives involving fundamental structures, composition of faculty, internal networks of education and communication, and networks of external supporters. These initiatives relate to what is known about transformation in higher education, broadly, because the initiatives are clearly deliberate, address external structure and internal values, and institutional culture or assumptions and beliefs about the institution, and are more to less systemic. These (19) ADVANCE institutional sites employ facilitating factors for transformation especially through leadership, development of stakeholders, reward structures, and support generated outside the institution.

In conclusion, what appear to be the prospects for—and limitations upon—institutional transformation as a strategy and solution for the advancement of women faculty in science and engineering? Improvement in women’s status in academic science and engineering relies not merely upon the detection, cultivation, and enhancement of individuals’ backgrounds, talents, and skills. Rather, improvement depends on attention to organizational and environmental factors such as allocation of resources, access to interaction and collaboration in research, and operation of equitable evaluation schemes in the work and workplace (Fox, 1991, 1992b, 1998, 2000, 2003a, 2006b). To the extent that institutional transformation addresses such factors, it is a promising strategy for improving the status of women in academic science and engineering.

The NSF ADVANCE initiative, in particular, is an important, national initiative because it goes beyond focus upon individuals and deals with certain features of institutions as they shape outcomes for women. Transformation is a long-term investment and it will be a continuing process for recipients of the first two (and subsequent) rounds of NSF Institutional Transformation awards. Although it would be premature to declare “success” (or lack of it), gains appear to be made in structural areas, especially in work-family policies and practices, undertaken by 42% of the first 19 award sites; and in internal networks of education, communication, and mentoring undertaken for faculty in 74% of the institutions, and undertaken for departments, in 53% of the institutions (see Fig. 1). For systemic transformation—that is, transformation that extends to core, inter-related elements of the institution—attention to evaluation and tenure and promotion practices is critical and present in 21% of the institutional sites (Fig. 1).

Attention to systemic institutional components—including practices and policies of evaluation—is both crucial to and challenging for the establishment of equitable advancement. Equity in tenure and promotion is supported by organizational practices that involve relatively complete information on candidates’ records and qualifications, clear and written standards for evaluation, and systematic and specified processes for candidates as well as evaluators (Long & Fox, 1995, pp. 64–65). Processes of evaluation that are subjective, loosely defined, and a matter of “judgment” are associated with bias and inequity (Blalock, 1991; Fox, 1991; Reskin, 2003). Further, it is important to consider that changes in composition of faculty—through recruitment of women—may not, by themselves, transform key,

systemic, institutional practices, such as evaluation. This is because increasing the “numbers of women” in science, while requisite, does not necessarily change patterns of status and hierarchy within an institution or change patterns of valued norms and values that may favor currently dominant groups (Fox, 1999, pp. 453–454).

Transforming key practices and policies, especially those involving evaluation in higher education, is difficult and complex. Academic institutions tend to be decentralized, with decision-making about promotion and advancement occurring in a range of departmental units that exercise—and claim—degrees of “autonomy.” Decentralization of authority and decision-making certainly has organizational advantages: it enables flexible and rapid response to issues by individual groups and it may enhance responsibility across ranks. However, decentralization also has its costs: it can reduce the capacity to forge a broad, unifying organizational strategy, such as institutional transformation (see Harrison, 1994, p. 102).

The decentralization of decision-making in higher education reflects, in part, the strength of faculty. This strength—which makes faculty potentially critical allies and supporters as well as potential resisters to transformation—derives from the “legitimacy” of faculty’s role in higher education, their average length of time in institutions which far exceeds that of most presidents and administrators, and academic tenure which means that tenured faculty members cannot be dismissed readily and replaced (Burkhardt, 2002, p. 124; Keup et al., 2001, p. 26). In science and engineering fields, faculty strength is fortified further because the research programs, external funding, and graduate training of the scientific fields are especially critical to the universities’ levels of status, national ranking, and material resources (Benezet, 1977; Long & Fox, 1995; Salancik & Pfeffer, 1974). These factors can reduce administrators’ motivation to take steps to alter the decentralized decision making in departments’ of science and engineering (Fox, 2000).

Resistance of faculty or others may be considered an “inevitable part” of institutional transformation; and in fact, the existence of resistance may also be an indicator that transformation is at least beginning to take effect (Keup et al., 2001, p. 26). Current institutional arrangements tend to be embedded in the organization and supported by a given academic culture, so that attempts to change practices result in resistance (Burkhardt, 2002). For example, faculty members’ patterns of research collaboration and interaction that are constituted informally, with informal social boundaries for inclusion (or exclusion), may be resistant to transformative initiatives that seek to place junior faculty members in existing research projects and programs. Likewise, department chairs’ informal practices offering variable start-up packages or release time from teaching to newly recruited faculty may be resistant to transformative initiatives that subject practices of “administrative prerogative” to gender-equitable standards for incoming faculty. Further, “flexible,” unspecified, and subjective processes of evaluation, operating among faculty and among chairs, may be highly resistant to transformative initiatives that emphasize written guidelines and specified benchmarks for the performance and in turn, evaluation, of candidates for tenure and promotion.

When faculty members (and others) defend current practices and arrangements, they frequently invoke arguments that “excellence” is at stake (Astin & Associates,

2001, pp. 27–28; Burkhardt, 2002, p. 27). For example, faculty members and others may deflect transformative initiatives to help ensure equity in access to resources and opportunities for success if they regard these as practices that will reduce “excellence” by diminishing competition, rigor, productivity, and in turn, national ranking of the institution and individuals within it. Consequently, those undertaking transformative initiatives for the advancement of women faculty need to be aware of implicit (and often unexamined) beliefs about quality, perceived to be challenged by new, proposed practices and policies. Efforts for change will be enhanced if they connect with the institutions’ values and missions. The capacity for institutional transformation rests, in part, upon “finding ideas that fit needs” (Daft, 2004, p. 427; Daft & Becker, 1978). Thus, in universities in which research values predominate, the acceptance of strategies for institutional transformation is enhanced when innovations proposed have a research-basis or strong research component (see for example, Allan & Estler, 2005, p. 230), or when the transformation is carried out in ways perceived to be “rigorous” and “theoretically sound” (Asmar, 2004).

Relatedly, the prospects for transformation are enhanced by positive “incentives” that support innovative practices and behavior (Fox, 2006b). Resistance to transformation tends to come from those who are invested in the status quo. An institutional structure can enhance transformation by reducing individuals’ sense of risk, and aligning efforts toward transformation with positive recognition and rewards—as in the example of ADVANCE institutional sites’ provision of material resources to departments for programs of climate change (Table 1).

Institutional transformation is a positive prospect for improving the status and advancement of women faculty in science and engineering. The success of sustained transformation rests with sustained organizational will. Those with authority to influence others and accomplish transformation can do so by continuing to direct the flow of signals, priorities, interactions, and critically, material and social rewards in favor of transformative practices and policies. This involves ongoing examination and attention to the ways in which the organization of departments and groups, evaluation of faculty, and distribution of human and material resources support gender equity in career outcomes. This, in turn, is a long-term organizational process.

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The State, the Market and the Institutional Estate: Revisiting Contemporary Authority Relations in Higher Education

Brian Pusser

Introduction

Over the past two decades, in nearly every arena of postsecondary education, traditional lines of authority, historical understandings of appropriate oversight and norms of political accountability have been rapidly changing (Burke, 2005; Hines, 2000). Essential understandings of such key elements in the postsecondary context as institutional autonomy, shared governance and organizational control are rapidly being transformed by challenges from a variety of stakeholders (Wellman, 2006; Marginson, 2006). A considerable body of emerging scholarship suggests that the balance of authority relations in higher education has changed dramatically over the past three decades, in line with shifts taking place in the larger national and international political economy of higher education (Heller, 2004; Pusser, 2003). These changes are increasingly apparent in the contested relationship between public postsecondary institutions and such key sources of authority and legitimacy as legislatures, governing boards and state agencies (Dunn, 2003; Longanecker, 2006). Contemporary literature on postsecondary organization and governance is replete with references to the rapid pace of change, increasing stakeholder demands and the pressures brought to bear by shifting political, financial and institutional relationships (Engell & Dangerfield, 2005). What emerges is an essential research question: “How should we understand contemporary authority relations in higher education?”

Over the past decade considerable research in higher education has been devoted to documenting the changes taking place in the political economy of postsecondary organizations (Breneman *et al.*, 2006; Slaughter & Rhoades, 2004). However, to date, relatively little scholarship has been devoted to revisiting the prevalent models of postsecondary authority relations, or to revising our understandings of those relations in light of contemporary cases of contest over postsecondary governance. This research addresses that gap in the literature through an analysis of a case of protracted contest over postsecondary authority relations, the institutional and political negotiations over the restructuring of Virginia’s public postsecondary system over the period 1996–2006. The case of Virginia’s restructuring is considered through the lens of one of the most influential models of authority relations in

higher education, Burton Clark's "triangle of coordination" (1983). Clark's triangle is used to extend our contemporary understanding of postsecondary authority through the analysis of its central elements: the State,¹ the market and postsecondary institutional leadership. The study of Virginia's restructuring suggests that contemporary research and policy literature on the rise of market influences in higher education has distanced the market from the State in ways that were not reflected in this case. Furthermore the evidence of the institutional estate as a proactive agent for change extends prevalent models of interest articulation and suggests that a more nuanced model may lead to better understanding of contemporary authority relations in the future.

Understanding Authority Relations in Higher Education

The roots of research on authority and governance in higher education can be traced to Adam Smith's reflections on competition and faculty salaries, Max Weber's work on professional expertise in rational-technical bureaucracies and Thorstein Veblen's critique of the role of commerce in university affairs (Ortmann, 1997; Weber, 1947; Veblen, 1918). After World War II the study of authority in universities and other prominent social institutions became the domain of scholars of organizations, primarily those based in the sociology of organizations (Blau & Scott, 1962; Pfeffer & Salancik, 1978; Simon, 1947). The adoption of organizational theory for understanding postsecondary authority and governance has had a profound impact on research in higher education as it has turned attention to such central analytical constructs as culture (Meyer & Rowan, 1977), stratification (Astin & Oseguera, 2004), isomorphism (DiMaggio & Powell, 1983), complexity (Clark, 1993), habitus (McDonough, 1997) and the role of professionals (Rhoades, 1998).

A number of scholars have more recently suggested organizational theory can be usefully employed in conjunction with models of colleges and universities as political institutions and sites of political contest (Cook, 1998; Moe, 1990; Pusser, 2003), a framework that turns attention to State theory, political economic frameworks, power and legitimacy (Hardy, 1990; Ordorika, 2003; Rhoades, 1992).

Three Forces in Tension: Clark's Triangle of Coordination

Perhaps the most notable early effort to bridge the divide between sociological and political-theoretical approaches to authority relations is the research developed by Burton Clark. In his pioneering work, *The Higher Education System: Academic*

¹ Throughout this document the capitalized form of State is used to distinguish the concept of the State from the individual states under discussion, such as Virginia.

Organization in Cross-National Perspective (1983), the State, market behaviors and “academic oligarchs” (where these are understood as powerful coordinating boards such as the British Universities Grants Committee, or powerful faculty members with influence over national postsecondary governing bodies) served as the anchors of a model of postsecondary governance systems. Clark’s work has served as one of the most influential models for understanding authority relations in higher education in the United States and internationally (Burke, 2005; Enders, 2004; Jongbloed, 2003).

Clark’s original formulation was concisely stated,

We begin on the simple ground by constructing three ideal types—state system, market system and professional system—which, in combination, offer two-and three-dimensional spaces for comparing national systems. Greater complexity is then introduced by specifying some pathways along which each major type of integration moves. Since the machinery of the state becomes the central tool, even in shaping the markets of higher education, the analysis then highlights the fusion of state and market, and turns to the main interest groups that in various countries have strong hands on that machinery (1983, p. 136).

Later in the work, Clark elaborates upon the state/market fusion. He reframes the continuum in terms developed by Lindblom (1977), instead of,

The two ends of the continuum may be seen as state administration and market in pure form, with the result, “Higher Education systems vary widely between dependence on authority and dependence on exchange: the more loosely joined the system the greater the dependence on exchange” (1983, p. 138).

Clark categorized a number of national higher education systems along the continuum of State and market, with Sweden most closely linked to State control and the United States the most highly market influenced, where at the limit a market system is essentially “synonymous with nongovernmental, nonregulated,” (p. 138). Furthermore, Clark suggested that movement along the continuum from State to market would occur over time as contextual shifts generated less formal control systems and authority relations. He then moved his conceptual model from continuum to triangle by adding a third dimension to the model, the possibility that under conditions of weak State or market influence, an “academic oligarchy” comprised of some combination of national education ministries and powerful academics would exercise significant authority (See figure 1).

The United States, while possessing influential faculty in elite institutions, has never developed a classic academic oligarchy. Clark presented the United States as the national system most open to market forces, in which competition serves as a primary form of control. Lacking a bureaucratic State apparatus as a control mechanism, the United States is also the nation where the “professionalization of administration has been uniquely strong at the institutional level” (p. 149). Clark noted the importance in the United States system of what he termed, “localized bureaucracy” (p. 128), the institutional administration and the growing influence and formalization of that bureaucracy in the United States:

The drift of authority for a quarter-century has been steadily upward, toward a growing web of multi-campus administrations, coordinating boards of higher education, state legislative committees and executive offices, regional associations, and a large number of agencies of the national government (1983, p. 130).

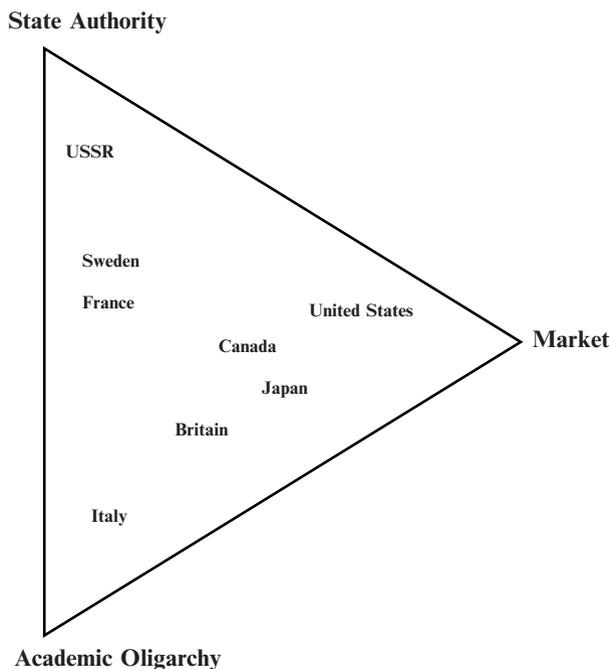


Fig. 1 The triangle of coordination (From Clark, 1983, p.143)

For the purposes of analyzing authority relations, it is useful in the United States case to conceptualize an “academic estate” rather than an academic oligarchy. In the academic estate power is vested in institutional leaders, faculty governance structures and internal governing boards (Pusser, 2004). Although the relative lack of authority possessed by faculty or ministries in the United States has been echoed by much of the subsequent research on higher education governance (Baldwin & Chronister, 2001; Pusser & Turner, 2004), a key distinction needs to be made between faculty governance and institutional authority. Contemporary research has argued that the institutional estate is a powerful actor in governance contests, with considerable authority, legitimacy and interests. While the institutional estate has historically been conceptualized as an “interest articulator” (Baldrige, 1971; Mortimer & McConnell, 1978) it has been more recently conceptualized as a significant representative of the university in authority contests and as an interest in its own right (Marginson & Considine, 2000; Ordorika, 2003; Pusser, 2004).

In discussing market relations in higher education, Clark drew upon Lindblom’s (1977) tripartite model of consumer, labor and institutional markets. Clark presciently noted the rise of students as consumers, with their enrollment and consumption patterns shaping institutional array, curricula, majors and departments (Winston, 1999). Clark also noted the importance of portable financial aid and student

choice in fueling the higher education competitive arena with money. “In education, student payments to institutions are the clearest example: when we hear the word *tuition* we are in the presence of a consumer market” (1983, p. 162).

Postsecondary labor markets are understood in Clark’s formulation as key to the pursuit of revenue from funded research, as colleges and universities compete for researchers capable of excelling in grant competitions. A similar competition exists for talented faculty to teach at the undergraduate level and for student affairs professionals to shape the quality of student life on campus, all of which contribute to institutional prestige and rankings (Marginson, 1997).

Institutional markets are portrayed as sites of competition between institutions, for prestige, reputation and resources, as mediated by State action and market forces that provide inducements or sanctions for particular types of institutional behavior. The primary State mechanism for shaping institutional markets is the allocation of resources, traditionally the role of the provider State, and the imposition of regulatory constraints, the traditional role of the regulatory State (Carnoy & Levin, 1985). At the same time, institutional markets are shaped by institutional actors as they endeavor to shape their own missions, garner external resources and position themselves within prestige hierarchies.

A review of research and scholarship on each of the three components that shape our fundamental understanding of authority relations offers the foundation for better understanding Clark’s model and its relevance for the analysis of a case of contest over authority relations in contemporary higher education.

The State

The study of the State is the study of politics. As Carnoy (1984) put it, “To understand politics in today’s world economic system, then, is to understand the national State, and to understand the national State *in the context of that* system is to understand a society’s fundamental dynamic” (p. 3). While the State is a fluid construct, in theoretical models the State generally encompasses political institutions, the formal and informal rules and laws that guide society, the judicial system and formal aspects of local and federal power including law enforcement and the military (Carnoy, 1984). Skocpol defined the State this way:

A state is any set of relatively differentiated organizations that claims sovereignty and coercive control over a territory and its population, defending and perhaps extending that claim in competition with other states. The core organizations that make up a state include the administrative, judicial and policing organizations that collect and dispense revenues, enforce the constitutive rules of the state and society, and maintain some modicum of domestic order, especially to protect the state’s own claims and activities (1992, p. 43).

Through its institutions and processes the State has historically been a site of contest for shaping collective activity and protecting individual rights in support of the public good. As Feigenbaum, Henig and Hamnett put it, “states represent the institutionalized capacity of societies to deal with their collective problems” (1999, p. 2).

Schumpeter (1942) offered an important clarification to the model of the State as a site of contest over collective action by adding the concept of the State as an actor with power and interests of its own. Gramsci refined the concept of the State as a site of hegemonic conflict, where tension and contest shape the nature of State institutions (Gramsci, 1971). The work of Gramsci and Schumpeter has influenced a considerable body of work that argues that not only is the State a site of contest, so too are the institutions of the State, including the postsecondary education system (Ordorika, 2003). Skocpol summed these perspectives up this way: “On the one hand, states may be viewed as organizations through which collectivities may pursue distinctive goals, realizing them more or less effectively given the available state resources in relation to social settings. On the other hand, states may be viewed more macroscopically as configurations of organization and action that influence the meanings and methods of politics for all groups and classes in society” (1985, p. 28).

Theoretical modeling of the State in relation to education over the past three decades has been directed primarily to elementary-secondary education and neo-Marxist in orientation, drawing on classic theories of the capitalist State and education (Bowles & Gintis, 1976; Giroux, 1983). Social theorists working beyond higher education address a number of aspects of the State that could usefully be applied to the study of a wide variety of institutions, including colleges and universities. Foremost, the State is a more comprehensive and nuanced construct than the more commonly invoked concept of government, one that seeks to understand governmental action and institutional behavior on many dimensions and through multiple lenses. As Alfred Stepan noted,

The State must be considered as more than the “government.” It is the continuous administrative, legal, bureaucratic and coercive systems that attempt not only to structure relationships *between* civil society and public authority in a polity but also to structure many crucial relationships within civil society as well (Skocpol, 1985, p. 7).

Furthermore, the State as an analytical lens moves beyond pluralist understandings of interest group competition as it incorporates cultural, historical and social norms as key instruments of political, economic and civic transformation. Finally, the State has long been a site of intellectual and theoretical contest, one that offers a rich comparative narrative extending back some four centuries and that has often focused on the role of education in society (Mansbridge, 1998).

The State and Research on Higher Education

In a comprehensive review published in *Higher Education: Handbook of Theory and Research* in 1992, Gary Rhoades examined leading higher education journals and classic works to determine the extent and the nature of attention to the State in higher education research. He found relatively little work on the State, with two notable exceptions, Barrow’s *Universities and the Capitalist State* (1990) and Slaughter’s *The Higher Learning and High Technology*

(1990). Rhoades pointed to the limited conceptualization in higher education research of the relationship between the State and higher education, one that had placed the State at some distance from higher education and higher education institutions: “Whether in everyday usage or in scholarship, the state is always someone and/or something else. The state is distinct from, and in contraposition to, the academy” (1992, p. 85).

Fifteen years later the State is rapidly becoming more prominent in postsecondary research, particularly in the international and comparative arena. Increased attention to globalization (Currie, 1998; Levin, 2001), neoliberal restructuring (Rhoads & Torres, 2006; Slaughter & Rhoades, 2004) and the rise of entrepreneurial universities (Marginson & Considine, 2000; Breneman *et al.*, 2006) have raised awareness of the role of the State.

In a relatively new body of literature on the State, colleges and universities are seen as key sites of contest over the role of education in achieving essential State purposes (Hardy, 1990; Slaughter & Rhoades, 2004). As institutions of the State, it has also been argued that postsecondary institutions are fundamentally political institutions, sites for the allocation of public costs and benefits, mediated by political action at the individual state and federal level (Ordorika, 2003; Pusser, 2004). As political institutions, colleges and universities generate significant public and private costs, and benefits (Savage, 1999; Marginson, 2006), they implement policies and programs with great symbolic and instrumental political salience (Hannah, 1996; Weiler, 1983) and are themselves instruments in broader socio-political contests over social reform and other forms of activism (Bowen & Bok, 1998; Rhoades & Rhodes, 2003). The role of the State in promoting economic development and workforce training has been central to both the analysis of the emerging economic role of community colleges and the study of contemporary community college workforce training (Dougherty & Bakia, 2000; Dowd, 2003; Levin, 2001).

The Neoliberal State

Perhaps no other perspective on the role of the State has achieved the prominence in contemporary research and scholarship accorded to neoliberalism. In *A Brief History of Neoliberalism* (2005), David Harvey described its elements this way:

Neoliberalism is in the first instance a theory of political-economic practices that proposes that human well being can best be advanced by liberating entrepreneurial freedoms and skills within an institutional framework characterized by strong private property rights, free markets and free trade. The role of the state is to create and preserve an institutional framework appropriate to such practices (2005, p. 2).

Only recently has research and scholarship on higher education in the United States turned attention to the neoliberal State. Perhaps because its impact was not fully clear, there is virtually no mention of neoliberalism in Rhoades’s 1992

review of the treatment of the State in higher education. Early research on globalization turned attention to the potential effect on education of a number of pillars of neoliberalism, including the withdrawal of resources from the State, a retrenchment from public sector projects, the rise of privatization initiatives and the deskilling of professional work (Castells, 1996). In the 1990s a literature on globalization and education began to address models of the neoliberal State (Carnoy et al., 1993) and attention soon focused on neoliberalism and higher education (Levin, 2001; Marginson, 1997).

The State and Higher Education: A Dynamic Tension

Understanding the transformation of the role of the State in US higher education is complicated by the traditional allegiance of scholars, policy makers and institutional leaders to the conceptualization of the United States postsecondary arena as a system driven by the sum of the actions of each of 50 states (Parsons, 1997). However, it may be more analytically useful to understand postsecondary institutions in the US as shaped by a complex array of forms of State control, as manifest through various forms of formal and informal power, individual and interest group activity, and by state and federal action within the broader State network of authority. In the United States, as in many other nations, a number of higher education institutions were founded prior to the formation of their respective modern States (Ordorika and Pusser, 2007). As such, these institutions were instrumental in supporting the development and expansion of the State as well as its intellectual and social capital and political legitimacy. Postsecondary institutions continue to be key components of State development, despite the tendency in the research and policy communities to regard postsecondary institutions and political entities as distinct and in conflict.

Research on the State and higher education identifies three key areas of State authority over higher education. The first is the role of the State in providing subsidies to public and private institutions for education, research and service (Payne, 2003; Winston, 1999). The second is the ability of the State to regulate institutional activity in the service of broader State projects (Boyd, 2001; Calhoun, 2006; Rensburg, 1996). The third is the State's ability to promote access and opportunity through education to redress the inequalities inherent in State support for economic development (Pusser, 2004; Garcia, 1997).

The scholarship of postsecondary transformation in the United States over the past three decades suggests that these areas of State action are interrelated and that there have been major shifts in the role of the State in all three dimensions. The effect of these shifts is presented in contemporary scholarship on postsecondary privatization (Bok, 2003); the rise of earmarks and other forms of federal funding for research (Savage, 1999); the changing legal terrain shaping higher education revenue generation (Olivas, 2004; Baez & Slaughter, 2001); and the contests over access and affordability in higher education (Bowen et al., 2005). Despite the

plethora of articles documenting and describing the shifts taking place in contemporary higher education, few link those shifts to the changing nature of the State's relationship with higher education, or to the balance between State action, market forces and institutional autonomy.

One essential exception is the work of Sheila Slaughter and her collaborators on the rise of what Slaughter and Leslie (1997) termed, "academic capitalism". In *Academic Capitalism and the New Economy: Markets, State and Higher Education*, Slaughter and Rhoades construct a theory of academic capitalism. Drawing on Foucault's model of professional and intellectual regimes (1977), and Castell's (1996) new economic network theories, the authors document the emergence in 21st century higher education of an "academic capitalist knowledge/learning regime" (2004, p. 15). This regime is seen as a series of networks, supported by State resources, regulations and legitimacy that "link institutions as well as faculty, administrators, academic professionals and students to the new economy" (p. 15) through a web of markets and market-like behaviors situated at every level of the institution, and that extend through governing boards and professional networks far beyond the academy (Pusser et al., 2006). Under academic capitalism the State, the market and institutions are seen as fragmented, with various disciplines, areas of research and academic functions seen as either close to the market or at some distance. The theory of academic capitalism has become a reference point for research on authority relations in contemporary higher education.

The Market

The second key construct in Clark's triangle of coordination, market influence, has achieved remarkable prominence in contemporary global culture and in higher education research since the time of his writing. As Amartya Sen (1999, p. 111) notes,

The virtues of the market mechanism are now standardly assumed to be so pervasive that qualifications seem unimportant. Any pointer to the defects of the market mechanism appears to be, in the present mood, strangely old-fashioned and contrary to the contemporary culture (like playing an old 78 rpm record with music from the 1920s).

Over the past two decades there has been a vast increase in the number of works addressing higher education as a market (Clark, 1998; Geiger, 2004; Marginson, 2004; Massy, 2004). A number of factors drive the increased attention, including research on globalization and higher education (Levin, 2001; Currie, 1998), the shifting role of the State as a resource provider to colleges and universities (Ehrenberg, 2000; Heller, 2004; Slaughter & Rhoades, 2004), the conceptualization of students and parents as consumers of higher education (Peters, 2004) and the rise of publicly-traded, degree-granting for-profit universities (Breneman *et al.*, 2006; Floyd, 2005; Pusser & Doane, 2001; Pusser & Wolcott, 2006; Tierney & Hentschke, 2007).

The dramatic increase in contemporary research, scholarship and commentary on markets and higher education has deep roots in social thought. Pedro Teixeira cites four

figures as “founding fathers” that have shaped contemporary views of contemporary education and markets. He credits Adam Smith and his analysis of such key issues as opportunity costs, the public social benefits of education and the role of competition in generating excellence; John Stuart Mill for turning attention to the public benefit of education in developing the citizenry, the economic value of education and the challenge of under-investment; Alfred Marshall for his work on the linkage between education and productivity and the need for government to address the capital constraints on individuals seeking to invest in personal education; and Milton Friedman for challenging the role of government in education as he argued for greater competition and new forms of funding directed at individuals rather than institutions (Teixeira, 2006).

Marginson (2006) argued that the work of F. A. Hayek has been instrumental in advancing market models for higher education through Hayek’s development of neoliberal competitive approaches to State functions. He also suggested that Gary Becker’s work on human capital moved Smith’s invisible hand of rational, maximizing behavior from the traditional realms of economic analysis into nearly every sphere of public and private life.

These social theories, which generally addressed the role of the market and political action in shaping individual behavior, were brought more fully into research on public institutions by a group of scholars of economics and political science including Oliver Williamson (1975) Charles Lindblom (1977), Mancur Olson (1965), Douglas North (1991) and Barry Weingast (1984). What subsequently emerged was the conceptual modeling of an arena that has come to be broadly defined as the New Economics of Institutions. These analyses were applied directly to education in Chubb and Moe’s influential *Politics, Markets and America’s Schools* (1990) and a number of works on market competition and higher education (Masten, 1995; Wilson, 2004).

Nonprofit Markets

The interest in applying models of political-economic competition to the transformation of State institutions turned attention to the nature of nonprofit organization, the dominant form of postsecondary control (Weisbrod, 1998). A number of economists and other social scientists have endeavored to build a theoretical model to account for the distinctive missions, character and processes of nonprofit organizations. Hansmann (1980) and James and Rose-Ackerman (1986) focused on the tax-exempt status of nonprofit organizations and the constraints and advantages of that status as nonprofits seek to achieve their goals. Weisbrod (1988) suggested that nonprofits emerged to produce those goods and services that are socially desirable in areas where neither government nor for-profit organizations can produce those goods effectively and where donative income was essential. He further argued that it is more useful to think of various organizational forms as emerging to meet specific social needs, or niches, rather than as existing in direct competition with all other organizational forms.

Salamon (1995) modeled the distinctions between the public sector, the private sector and the nonprofit sector, noting that the boundaries have been alternately blurred and sharpened over time under different conditions and policy environments. Following Samuelson (1954) he offered two key concepts for understanding nonprofit production. First, there are a number of collective (public) goods, such as clean air and national defense that are not excludable; that is, once produced they cannot be directed to some individuals and not others. As a result, a free-rider problem exists; an individual has no incentive to pay for the good if it can be obtained free through the efforts of others. Second, given the unequal distribution of information across a given society, many individuals may lack awareness of the personal or social utility of a particular good and under-invest in ways that are socially sub-optimal. Under those conditions, governments will often take over the production of the collective good and tax individuals accordingly.

Markets, Public Goods and Private Goods

A number of recent works on markets and higher education have focused on the role of colleges and universities in the production of public and private goods (Calhoun, 2006; Marginson, 2006; Pusser, 2006). One of the earliest contests over public and private goods in higher education emerged during debate over the Higher Education Act of 1965 and the Education Amendments of 1972 (Gladieux & Wolanin, 1976). At issue was whether State financial support for higher education would be directed to institutions or to individuals in the form of portable financial aid. The debate took place in a policy environment marked by the ascendance of human capital theories that conceptualized education as an investment (Friedman, 1962; Becker, 1976) and a shift away from earlier models of education as an individual right (Rich, 1979; Sunstein, 2004). The choice of Pell Grants and the federal student loan program rather than greater aid to institutions marked a significant shift in postsecondary authority relations. A number of scholars have argued that the portable financial aid that emerged from the Education Acts of 1972 created a more competitive postsecondary environment and a national market for student enrollments (Breneman & Finn, 1978; Winston *et al.*, 1998).

Most recently, research in higher education has addressed a new model of higher education and the public good based in theories of the public sphere. Researchers building on Habermas and other critical social theorists have conceptualized the contemporary university itself as a public good in its role as a public sphere (Calhoun, 2006). Marginson noted,

Like the university today, Habermas's public sphere provides for a non-violent form of social integration based on discourse rather than power or money. Information and education enable the public to reach not just a common opinion but a considered one (Calhoun, 1992: 6, 14, 29–30). The classical public sphere had a capacity for criticism independent of the state, sometimes directed to it, while contributing functionally to the state (Habermas, 1989: 41, 51). This describes contemporary state/university relations at their best (Marginson, 2006, p. 52).

Central to the model of the university as a public sphere is the realization of an enhanced form of university autonomy in which the university serves as a site for knowledge production, deliberation and contest beyond the control of the State, private interests or the institution itself (Ambrozas, 1998; Pusser, 2006).

The Limits of Markets for Higher Education

Scholars have long noted that there are significant limitations in applying market models to higher education, with some questioning whether competitive behaviors in the postsecondary arena are appropriately characterized as market competition. Gordon Winston noted a number of conditions that render market models for higher education problematic, including the fact that because of its mix of donative, tax and commercial revenue, a typical public college or university offers its “product” at a price far below the cost of production (1997), while Leslie and Johnson (1974) were more definitive: “the various market-related characteristics of higher education in no way approximate the sufficient conditions of the perfectly competitive market model” (p. 14). Massy (2004) found that while markets may contribute to institutional efficiency, market failures, lack of information and shifting institutional missions limit the impact of competitive effects. Dill and Soo (2004) argued that competition and self-regulation may be insufficient to ensure increased quality without some State role to ensure that information on institutional effectiveness is widely available. Bowen *et al.* (2005) suggested that, at best, market approaches to higher education will need to be supplemented by other forms of authority:

The higher education market, left to itself, cannot be expected to produce socially optimal results. Imperfect information, credit constraints and externalities (“spill-over benefits”) are all relevant. Potential students may under-invest in their own education, and the interest of society as a whole in outcomes such as preparation for citizenship, the promotion of social mobility, and the advancement of learning may not be served adequately if market mechanisms alone have to be relied upon to determine the resources available to higher education and their allocation (p. 194).

The Institutional Estate

The third point on Clark’s triangle of coordination corresponds to what he termed the “academic oligarchy.” Contemporary research on the role of faculty in governance, and on postsecondary governance writ large in the United States goes considerably beyond Clark’s formulation. Two primary strands of literature have emerged, one concerned with the role of faculty in postsecondary governance (Hamilton, 2004; Tierney, 2006), the other more broadly directed at the governance and leadership of colleges and universities (Birnbaum, 1988; Kerr & Gade, 1989; Tierney, 1999, 2004).

A faculty role in the governance of postsecondary institutions has been a central tenet of academe for at least a century (Veysey, 1965). Hamilton described the prevalent understanding this way:

There is a wide consensus that the faculty peer collegium, exercising its peer-review responsibility, should have primary authority over core academic issues including standards for admitting students; curriculum; procedures of student instruction; standards for student competence and ethical conduct; maintenance of a suitable environment for learning; the standards of faculty competence and ethical conduct; and the application of those standards in faculty appointments, promotions, tenure and discipline (Hamilton, 2004, pp. 96–97).

Contemporary research on faculty governance generally finds that faculty influence over institutional governance in the United States has diminished as the number of part-time and non-tenured faculty in academe has increased (Baldwin & Chronister, 2001; Schuster & Finkelstein, 2006).

Contemporary research on the role of faculty has also begun to turn attention to the entwining of State, market and institutional estate in academic governance. Rhoades's *Managed Professionals* (1998) points to the changing conditions of faculty governance and collective bargaining in light of local, state and national political and economic challenges, while Baldwin and Chronister (2001) documented the shifting faculty array, the rise of part-time and contingent faculty in response to institutional resource constraints. In work on the decline of guilds, Elliott Krause (1996) linked a variety of shifts in professional authority writ large to changes in academic policies shaping faculty work in schools of medicine, law and education. He summed up the relationship this way:

To what extent do American professors, as a group, control their own relations to the market and the state? Not very much at all except for an elite group of professors, in a small number of elite universities, who can switch universities at will, even after tenure and in bad times, for the right offer, and who have formed close relations with the state (through success in the federal grant system) or with private industry (1996, p. 74).

Levin *et al.* (2006) have argued that community college faculty have become subordinate to the demands of neoliberal restructuring and have lost status as professionals and as contributors to institutional governance in the process. Tierney (2006) argued that the reorganization of academic structures and faculty work in coming decades will require new forms of faculty voice and participation in governance. He suggested that trust and attention to the public good are essential for a successful transition in postsecondary governance.

Administration and the Institutional Estate

While considerable attention has been turned to the role of faculty in governance, far less research has focused on the role of institutional administration in post-secondary authority relations. Hines noted that the number of “claimants to authority” (2000, p. 105) had grown over the previous two decades, shifting the stakeholders in governance contests. He also observed that what had been a largely internal process increasingly incorporated a wide variety of constituents within and beyond the campuses. He pointed both to an increasingly corporate form of institutional governance revolving around a more prominent and active role

for governing boards and trustees and to the rising influence of such external stakeholders as governors, legislators and other policy makers at the system and campus levels.

It is worth noting that in a detailed review of the literature, Hines found virtually no research addressing the role of administration in university governance, other than literature on presidents. That is, the prevalent governance literature of the past two decades has focused on faculty governance, the presidency, governing boards and external stakeholders, with scant attention to the role of institutions as actors in contests over authority relations.

University Autonomy

Another key concept underpinning the institutional estate is the concept of institutional autonomy. Autonomy has a considerable history in research and scholarly literature on the organization of higher education (Berdahl, 1971; Glenny, 1959; Neave & van Vught, 1991; Sabloff, 1997; Slaughter, 1998). Martin Trow (1996) offered a set of twin principles through which he suggested academic excellence is essential to preserving institutional autonomy:

These two principles are first, the maximization of the University's autonomy-its capacity to direct its own affairs; and second, the pursuit of pre-eminence-or how to become or remain the best university in the country in every possible department, service and activity (1996, p. 202).

Trow also suggested that the key to institutional autonomy is the resistance of partisan pressures within or upon the academy, and offered two principles, autonomy and excellence, as central to that resistance:

These two values or principles are mutually reinforcing. University autonomy allows the university to remain largely meritocratic in its academic appointments and promotions, and, within limits, in student admissions and non-academic staff appointments as well. And the vigorous pursuit of competitive excellence gives the University the world-wide reputation that is the major bulwark and support for its institutional autonomy (1996, p. 202).

Three significant political-economic movements have shaped the development of postsecondary autonomy in the United States. The first was the creation of the land grant colleges under the two Morrill Acts. Given that operational control of the new universities was negotiated through charter agreements with their respective states, the Morrill Acts also commenced the struggle for authority between public universities and legislatures that has shaped much of the subsequent research on institutional autonomy in the United States (Berdahl, 1971; Dee, 2006; Millett, 1984).

The second key factor shaping the contest over institutional autonomy has been the rise and evolution of what has variously been called "the Cold War University (Lowen, 1997), the "Federal Grant University" (Kerr, 2001), and the "academic capitalist knowledge/learning regime (Slaughter & Rhoades, 2004). The massive allocation of federal research funds post-World War II for national defense brought the development of university science and technology to unprecedented levels and

entangled research universities in webs of relationships with the State (Anderson, 2001; Powell & Owen-Smith, 1998; Slaughter & Leslie, 1997).

The third transformation shaping institutional autonomy in the United States grew out of the passage of HEA 1965 and the Education Amendments of 1972. Taken together, these congressional actions created a far more significant and comprehensive State role in postsecondary education (Gladieux & Wolanin, 1976). In addition to their effects on State subsidies to higher education, the Education Amendments of 1972 also authorized the creation of individual state postsecondary planning commissions, and shortly thereafter they had been established in nearly every state (Berdahl, 1990).

Before 1972, literature on postsecondary autonomy in the United States was fundamentally oriented to the relationship between state colleges and state systems. James Perkins's 1965 chapter on autonomy in *Emerging Patterns in American Higher Education* makes virtually no mention of a coordinated federal role. Logan Wilson introduced the volume with the comment that "there is really no formalized, national system of education in the United States" (1965, p. 1). The Higher Education Acts may not have led, as was predicted in a 1968 edition of the *Public Interest*, to "nothing less than a reshaping of the American social order" (Gladieux & Wolanin, 1976, p. 39), but it is hard to otherwise overstate their impact on the institutional estate.

Academic freedom is another fundamental concern in the literature on autonomy, though it is an issue that has been directed more often at individuals than institutions (Hofstadter & Metzger, 1955; Rabban, 2001). This literature ranges from reconsiderations of the AAUP's 1915 Statement of Principals (Keller, 2004) through contemporary legal and political challenges to individual and institutional autonomy (Altbach, 2001; Keller, 2004; O'Neil, 2004). Like many of the other issues that are interdependent with postsecondary autonomy, scholarship on academic freedom generally encompasses the role of the State through the legal system and through political challenges to university decisions (Olivas, 2004).

A central aspect of the scholarship on institutional autonomy is research that addresses university accountability (Burke, 2005; Trow, 1976, 1996; Zumeta, 2001). In many ways accountability in this literature is a proxy for institutional control. Burke (2005) presents a series of models of accountability systems, each with "levers" of control that include bureaucratic, political, managerial, and market controls. Following Clark, he also develops an "accountability triangle" that suggests accountability programs emerge from tension between State priorities, market forces and academic concerns (2005). Zumeta (2001) argues that both private and public institutions are vulnerable to State demands for cost containment and accountability and suggests that State action should seek balance between market demands, State regulation and professional expertise.

Authority Relations in Contemporary Higher Education

As it turns attention to the tension between State authority, markets and the institutional estate, Clark's triangle of coordination can be usefully applied to two fundamental questions emerging from contemporary contests over postsecondary

authority relations. First, are the market, the State and the institutional estate apparent as key factors in the contemporary contest over authority relations in higher education? Second, if these forces are drivers of contemporary contests over authority relations, how do they manifest themselves, and what is the balance of legitimacy between these forces? In order to answer those questions we turn to a contemporary case of political contest over authority in higher education in light of research on the role of the State, the market and the institutional estate in post-secondary organization and governance.

Postsecondary Restructuring in Virginia

Over the past two decades in Virginia, the Commonwealth's² postsecondary institutions have pursued initiatives in negotiation with the legislature to increase institutional autonomy and influence over a variety of substantive and procedural policies (Breneman & Kneedler, 2006; Couturier, 2006; Leslie & Berdahl, 2006). The Virginia case has been widely heralded and analyzed for its relevance in understanding university autonomy and contemporary authority relations in higher education.

In the spring of 2005, the Virginia General Assembly culminated nearly a decade of political contest with the passage of *The Restructured Higher Education Financial and Administrative Operations Act of 2005* (Restructuring Act). One of the more closely watched restructuring initiatives in contemporary postsecondary education in the United States, the contest over the Restructuring Act raised significant issues of the power and legitimacy of the State, market forces, and postsecondary institutions in establishing a balance of authority over public higher education in Virginia. Despite the widespread perception in the postsecondary research and policy literature of the ascendance of market authority in higher education, the bill signed into law in 2005 by Governor Mark Warner reaffirmed the strength of the State and the power of the public mission of higher education. At the same time, it demonstrated the importance of market revenue in emerging state planning for higher education and the legitimacy of a significant degree of institutional autonomy in university governance (Couturier, 2006; Breneman & Kneedler, 2006; Buer *et al.*, 2007).

The Case of the Commonwealth

The Commonwealth of Virginia was the tenth state to ratify the United States Constitution in 1788. The population of Virginia in 2005 consisted of just over 7.5 million people. The public higher education system included 15 four-year institu-

²The term Commonwealth has been used to describe the governance structure of Virginia since prior to its becoming a state in 1788. The terms state and Commonwealth are used interchangeably.

tions, 23 community colleges and one two-year junior college. These institutions enrolled a total of just over 357,000 students, with 197,000 in four-year institutions and 160,000 in two-year colleges, constituting the 11th largest postsecondary system in the United States. The array of institutions is varied, including both new and venerable colleges and universities, historically black colleges, and urban and rural institutions. Of Virginia's 39 institutions, 3 figured most prominently in the negotiations over the Restructuring Act, the University of Virginia (U.Va.), the College of William and Mary (William and Mary) and Virginia Polytechnic and State University (Virginia Tech). Each institution also looms large in the political economy of the state of Virginia and is a significant presence in national postsecondary affairs. The University of Virginia, with a 2006 enrollment of 20,000 students is a Carnegie classification RU/VH institution, and has consistently ranked among the top three public research universities in the United States over the past decade. Founded by Thomas Jefferson in 1819, it is one of the most prominent and successful public universities in the country. William and Mary, founded in 1693, enrolled 7,700 students in 2006 into what has long ranked as one of the most selective small public colleges in the country. Virginia Tech, with over 28,000 students in 2006, is a land grant institution with a Carnegie classification of RU/VH. In 2002–2003, the University of Virginia and Virginia Tech ranked in the top 100 universities in the United States in revenue received from federal sources.

As in many other political contests over the organization and governance of public postsecondary institutions in the United States during the past two decades, the Virginia case has its roots in the adoption of neoliberal State finance policies and the subsequent general reduction in direct state aid to postsecondary institutions. Breneman and Kneedler (2006) note that aid from the Commonwealth to public institutions declined from 17% of the state's general fund budget in 1985 to 10% in 2004. In 1990 the state of Virginia provided approximately \$170 million annually to the U.Va, while in 2004 that allocation had decreased to about \$105 million. A similar pattern of reductions in direct funding prevailed at postsecondary institutions throughout the state. Funding declines were accompanied by considerable volatility in tuition prices (Couturier, 2006). From 1990 through 2000 the Virginia legislature implemented a number of tuition rollbacks and tuition freezes so that in 2002–2003 tuition for U.Va. students was lower than in 1995–1996 (Valenzi, 2006). The volatility in tuition setting was also emblematic of a larger struggle between the state of Virginia and its institutions for control of tuition setting authority. As Couturier explained,

It is no secret that the main goal of the leaders of the U.Va., William & Mary, and Va. Tech in seeking greater autonomy was to assert the authority of institutions' boards of visitors to set their own tuition and fees, thereby gaining control over one of their most important revenue sources (2006, p. 2).

In 2005–2006, the public degree-granting institutions in Virginia together generated total revenues of approximately \$4.5 billion (Chronicle Almanac, 2006). Of that total, \$1.5 billion came from Virginia state funds, \$887 million was from tuition and R & D funds totaled \$850 million. At the University of Virginia, the

2006–2007 budget for the Academic Division (not including the Medical Center Operations) comprised approximately \$1.1 billion in revenue. Of those funds, the largest single source was tuition, (\$300 million), ahead of income from sponsored research (\$287 million) and Virginia general fund revenues (\$204 million). Tuition has particular appeal as a source of revenue, because compared to endowment income or state funds, tuition is far less likely to be designated for specific projects (Ehrenberg, 2000). Net tuition price is also seen as a measure of competitiveness in the market for student enrollments. Geiger (2004), noted,

Public universities participate to varying degrees in the national market dominated by student power and qualitative competition. In this respect they have become more like private institutions, maximizing tuition revenues through strategic use of financial aid and seeking gifts and endowment to bolster quality (2004, p. 241).

He concluded, “Those institutions with sufficient autonomy from state coordination are best able to adapt to the national market by enhancing their quality and competitiveness” (p. 241).

In the 2007 US News and World Report rankings the University of Virginia was rated 24th among the nation’s top colleges, the second ranked public university behind the University of California at Berkeley. The two private universities ranked most closely to U.Va. were Georgetown University (23rd) and the University of Southern California (27th). For 2006–2007, in-state undergraduate tuition and fees at U.Va. were set at just under \$7,800. At Georgetown undergraduate tuition and fees for 2006–2007 totaled just over \$34,100 and at the University of Southern California, approximately \$33,900. Tuition and fees at Virginia Tech were just under \$7,000 while at William and Mary tuition and fees totaled \$8,500. In the competition for students, the tuition charged by Virginia’s public institutions has long been considered by many policy analysts to be well “below market” (Breneman & Kneidler, 2006).

The Origin of the Contest

The contemporary contest over authority relations in Virginia stemmed from a significant economic downturn that constrained state revenue for higher education in the early 1990s (Blake, 2006). By 1994 the Virginia legislature, working with recommendations from a legislative commission on the future of Virginia higher education, enacted a comprehensive appropriations bill that included requiring every institution to submit plans for achieving greater cost effectiveness, institutional efficiency and enrollment growth. As part of the debate over the appropriations bill, some consideration was given to a greater decentralization of authority over postsecondary policy and increased procedural autonomy for Virginia’s post-secondary institutions (Gumport & Pusser, 1999). While those provisions were not enacted by the legislature, they did set the stage for future institutional efforts to achieve greater autonomy (Leslie & Berdahl, 2006).

The economies of the state of Virginia and the United States improved significantly throughout the middle portion of the 1990s, yet the upturn did not result in

proportional increases in funding for Virginia's public postsecondary system. Nor did the uneven pattern of tuition increases negotiated with the Virginia legislature over that period restore combined revenues to prior levels. Breneman and Kneedler (2006) calculated that by 2002–2003 the combined revenue per student from Virginia appropriations and in-state tuition ranged from just under \$12,000 per student at Virginia Tech to just under \$15,000 at the U.Va. This compares to just over \$26,000 in combined per student state appropriations and tuition at UC Berkeley and just under \$27,000 at the University of Michigan (2006, p. 58, Table 5.1).

Just after the turn of the 21st century the Commonwealth again experienced an economic crisis, driven by a slowing economy and reluctance to raise taxes to support state institutions. In 2002, a Virginia legislature dominated by fiscal conservatives negotiated over social welfare and public functions with newly-elected Democratic governor Mark Warner. In that contest a number of state agencies were downsized or closed, services reduced, and state employees laid off. At the same time, the Commonwealth of Virginia was projecting postsecondary enrollment growth of some 60,000 students over the next decade. With the support of Governor Warner a statewide referendum was approved that generated nearly a billion dollars in funding for creating and renovating postsecondary classrooms, research laboratories and academic facilities throughout the Commonwealth (Blake, 2006).

Out of this welter of conflicting political currents, two strands of policy activity emerged. With a focus on issues of access, finance and economic development, the governor began working with the State Council of Higher Education for Virginia (SCHEV), college presidents, members of the legislature and national policy organizations to develop long-term plans for strengthening the state's postsecondary system (Blake, 2006; Couturier, 2006). The U.Va., William and Mary and Virginia Tech, began developing a plan to reshape their governance relationships with the state, placing particular emphasis on increasing institutional autonomy and garnering greater control over revenue streams and financial planning. Under their proposal, the three institutions would become "Commonwealth Chartered Institutions," with rights and responsibilities distinct from those governing the behavior of the other public colleges and universities in Virginia.

These two initiatives, set against the backdrop of rapid change in the higher education landscape across the nation, precipitated what would become nearly five years of negotiation between the state and institutional leaders over how best to redraw authority relations in order to increase institutional effectiveness and competitiveness.

The preliminary planning efforts of the trio of institutions became known as "the charter proposal." Initially, there were several factors that predicted success. In 1996, the University of Virginia had garnered legislative approval for deregulation of its academic medical center. Less than a decade later, the Darden School of Business at the University of Virginia received institutional and legislative approval for a restructuring designed to reduce its dependency on Virginia state funds in exchange for greater autonomy from the state and the university. Kirp (2003) noted that this was made possible in no small part by a legislative climate that favored entrepreneurial revenue generation by Virginia's state institutions. He cited a

Virginia Assembly document from 1996 that stated, “as higher education changes the way it conducts its business, the Commonwealth should consider changing its business relationship with higher education, develop[ing] a plan to grant selected institutions special independent status in state government [to free them from] stifling bureaucratic regulation” (Kirp, 2003, p. 134). In that spirit, as part of the original charter proposal, each of the three institutions sought to change its codified status from “state agency” to “political subdivision of the state,” a status previously reserved for counties and towns (Buer et al., 2007).

In 2004 the charter proposal was introduced in the Virginia legislature as the Chartered Universities and Colleges Act of 2004 (Chartered Act). It proposed that the U.Va., William and Mary and Virginia Tech be granted greater autonomy over revenue generation and expenditures, and the status of political subdivisions in exchange for a reduction in future fiscal allocations from the state. The Chartered Act asserted the right of each of the institutions to control its own tuition. This was necessary because the question of who actually possesses tuition-setting authority in Virginia has long been contested. Buer, Byrnett and Cabaniss argued that,

While the Code of Virginia states that the governing boards for institutions of higher education have the authority to set their own tuition, the legislature and the governor retain the final authority over undergraduate, in-state tuition and fees and exercise such authority as necessary to keep it at manageable levels (2007, p. 3).

Similarly, Couturier noted, “Even though each public college’s board of visitors technically has authority to set tuition, that authority has been overridden by legislators and governors alike in recent years” (2006, p. 2). Under the Chartered Act the institutions also sought legislative agreement that should state allocations continue to decline, the institutions would be empowered to increase tuition and increase the number of out-of-state students enrolled at significantly higher tuition rates (Couturier, 2006).

Contest and Resistance

For a variety of reasons, political opposition to the Chartered Act emerged early in the negotiations. The creation of distinctly different authority relations for three institutions from those that prevailed for the rest of Virginia’s public institutions was a major legislative and institutional concern. Not only did that portion of the proposal seem inequitable to some legislators, but the remaining institutions felt it also fractured the political coalition of institutions that had traditionally negotiated with the General Assembly and the governor. Then Virginia Secretary of Education Belle Wheelan put it this way: “The reality is the Commonwealth probably needs them more than they need the Commonwealth. It will hurt if we lose some of their leverage” (Burdman, 2004, p. 16). Staff organizations expressed concerns that granting the three institutions greater autonomy might adversely affect the status of college and university staff as state employees, with implications for health care

and retirement benefits (Gibson & Andrews, 2004). The Faculty Senate of the University of Virginia raised concerns over whether University employees hired after restructuring would receive different compensation and benefits than those hired previously (U.Va. Faculty Senate, 2005).

Within the General Assembly the Chartered Act was not the highest priority of legislators. Rather, they were enmeshed in wider contests over taxation and funding for public works projects and transportation. Governor Mark Warner, a Democrat who had run as a supporter of public education, directed his political energies and capital into an effort to increase taxes to provide \$1.5 billion for K-12 education and nearly \$300 million for higher education.

In light of these factors, the Chartered Act deliberations were continued to the next legislative session and the General Assembly created a joint subcommittee to consider a wider range of options in consultation with Virginia's postsecondary council of presidents. The subcommittee played two essential roles: it produced a list of policy changes that would form the essence of the ultimate restructuring legislation and its deliberations demonstrated that to be successful the final legislation would need to cover all Virginia public postsecondary institutions (Blake, 2006; Buer *et al.*, 2007). Governor Warner went on to pass his tax initiative and gained both greater fiscal support for higher education and a national reputation as a negotiator and coalition builder (Burdman, 2004; Couturier, 2006).

Early in the 2005 legislative session, companion bills HB 2866 and SB 1327 were introduced as the Restructured Higher Education Financial and Administrative Operations Act of 2005 (Restructuring Act). The final bill amended 13 sections of the Code of Virginia and added 45 new sections (Blake, 2006). It enabled any public postsecondary institution in Virginia to apply for one of three levels of autonomy (Levels 1–3), based on financial resources and managerial capacity. Each of the proposed three levels of autonomy provided additional degrees of operational control to the institutions approved at that level. Level I autonomy was to be granted to all institutions that agreed to meet the state performance goals that were included in the legislative act. Level II autonomy offered greater control over human resources and other labor agreements. Level III autonomy—which required considerable financial resources (a Level III institution was required to have at least AA-bond rating or equivalent evidence of fiduciary strength)—offered the potential for considerably greater procedural autonomy in the areas of accounting, human resources, procurement and institutional financing agreements. However, achieving Level II autonomy would require the negotiation of a memorandum of understanding with appropriate state agencies and Level III autonomy would require the negotiation of a management agreement with the governor and appropriate state agencies (Blake, 2006).

However, unlike its predecessor, the Chartered Act, the Restructuring Act codified a new set of accountability requirements and performance measures including 12 specific performance goals that came to be known as “the state ask” (Couturier, 2006). Under the Restructuring Act the governing board of each of the state's public institutions was required to pass a resolution agreeing to meet the 12 mandated performance goals and was also required to prepare—in collaboration with the State Council of Higher Education for Virginia—a six-year strategic plan

outlining how the institution would meet performance goals for such issues as access for traditionally underserved populations, affordability, academic standards, retention and time to degree. The performance goals also covered institutional contributions to economic development, technology transfer and external research funding, support for K-12 student achievement and transition to postsecondary education and articulation with community colleges for student transfer to four-year institutions (Blake, 2006; SCHEV, 2005).

The Restructuring Act was passed by the Virginia legislature and signed into law by the governor in July of 2005. A number of observers have suggested that the conditions and performance requirements in the bill may have actually constrained institutional autonomy while at the same time the legislation increased the reporting requirements for the universities (Couturier, 2006). As one example, the management agreement and attachments submitted by the University of Virginia in November of 2005 as part of the University's application for Level III autonomy was over 200 pages long.

Perhaps most notably, despite the early efforts to become political subdivisions, under the Restructuring Act Virginia public postsecondary institutions remained state agencies, public institutions of the Commonwealth. Opinions vary somewhat on how much control over tuition-setting authority was gained by the colleges and universities. The Restructuring Act did reaffirm that control of tuition resided with the Boards of Visitors of the public colleges of the state. The Restructuring Act created subsection B of the Va. Code § 23-38.104, which states,

Subject to the express terms of the management agreement described in § 23-38.88, in managing its operations and finances, the Board of Visitors of a covered institution shall have sole authority to establish tuition, fee, room, board, and other charges consistent with sum sufficient appropriation authority for all nongeneral funds as provided by the Governor and the General Assembly in the Commonwealth's biennial appropriations authorization (Va. Code § 23-38.104; Couturier, 2006).

Breneman and Kneedler interpreted tuition authority under the Restructuring Act this way:

The Restructuring Act reiterates the prior authority of institutions to set their tuition charges and fees, and tuition charges and fees may be addressed in the management agreement. A management agreement, however, is not a true 'contract' enforceable in court; it is the implementing document for a legislatively authorized program. Because one legislature may not constitutionally bind future legislatures to continue a government program, the Restructuring Act does not provide either a long-term guarantee of complete tuition charge 'autonomy' or absolute protection against later tuition charge and fee caps or freezes. Only an amendment to the state constitution could do that (2006, p. 65).

Breneman and Kneedler concluded, "As a practical matter, therefore, when coupled with the statutorily reiterated authority of institutions to set their tuition charges and fees, the approach of the Restructuring Act provides institutions with much greater tuition charge authority and flexibility than they had previously" (2006, p. 65).

A similar, cautiously optimistic tone generally pervades assessments of the broader Restructuring Act. A number of observers see an effective, albeit protracted political contest that resulted in both additional autonomy and greater regu-

lation of Virginia's public postsecondary institutions. Leslie and Berdahl noted that, "Seeking more autonomy from the State, Virginia public universities found themselves achieving increased procedural autonomy on the condition of the state assertion of tighter substantive control," (2006, p. 24).

Although the initial charter proposal raised concerns over a potential "privatization" of the Virginia public colleges and universities the final legislation focused upon both greater institutional freedom and accountability (Burdman, 2004). At the same time, it recognized the public interest in Virginia's public institutions and the desire of those institutions to exercise more influence in meeting their public missions.

Conclusion: Authority Relations and the Virginia Restructuring Debate

Burton Clark's triangle of coordination has proven remarkably robust over nearly a quarter century. The influence of the State, market forces and the institutional estate remain key factors for evaluating authority relations in higher education. As such, they are also central to understanding the Virginia restructuring contest. At the same time, the contest over the Virginia Restructuring Act offers a useful window for revisiting Clark's triangle of coordination and for consideration of the role of the State, the market and the institutional estate in contemporary authority relations.

The Market in the Restructuring Contest

In the early stages of the restructuring contest the U.Va., William and Mary and Virginia Tech aligned themselves more closely with the market than the State. After years of declining direct support from the Commonwealth, Virginia institutions argued that in the absence of greater state financial support they should be relieved of some forms of state regulation and oversight in order to increase institutional competitiveness, efficiency and excellence. The discourse adopted by the institutions early in the effort to achieve greater autonomy pointed to an excess of state regulation and to the potential for greater institutional autonomy to generate more entrepreneurial behaviors. Alan Merten, president of George Mason University remarked, "We estimate that during a 12-month period we send 200 reports to somebody in Richmond" (Burdman, 2004, p. 9).

In a letter written by a university vice-president in support of the restructuring initiative, Virginia Tech President Charles Steger was quoted to this effect:

Universities operate in marketplaces like any other business or institution. The 21st-century marketplace is defined by responsiveness and flexibility. To compete and attract the brightest minds, colleges and universities need to foster entrepreneurial environments to create joint ventures, acquire goods and services, or build new laboratories. Our institutions need to be able to accomplish these key administrative tasks very quickly, just like

the most effective businesses. Chartered legislation would provide administrative and fiscal flexibility to state schools to compete in new business-like environments (Hincker, 2005).

A common early theme raised by the institutions was the need to ensure institutional control over the setting of tuition and fees. Tuition is a complex revenue source to conceptualize. It has been often invoked as a driver of market competition in higher education (Ehrenberg, 2000; Geiger, 2004; Winston, 1997). Paradoxically, control over tuition revenue in public universities has historically been a power delegated to such State institutions as legislatures and postsecondary coordinating councils. The effort by the Virginia institutions to gain control over tuition setting can be seen as further positioning the institutional estate closer to the market than to the State.

The Virginia institutions gained wide support in the legislature and from the Governor's Office for the argument that granting greater institutional autonomy would support economic development in the Commonwealth. The market was also invoked in discussions of the continuing importance of competition for entrepreneurial research, technology transfer and other "market-based" revenue sources (Warner, 2006).

However, despite the ascendance of market-based rhetoric and calls for market-based policies in the broader political economy of higher education, arguments for greater market authority over college and university behaviors did not dominate in the case of Virginia restructuring.

The State in the Restructuring Contest

As the contest over restructuring evolved much of the discussion turned increasingly to linking the process of achieving greater autonomy to meeting specific State goals. Throughout the negotiations the institutions argued that additional institutional autonomy would facilitate meeting State postsecondary goals on a number of dimensions, including student access, retention and success, affordability and student diversity. Virginia's colleges and universities also argued that greater autonomy would enhance State efforts to develop human capital and distribute knowledge and training throughout the Commonwealth, particularly in traditionally under-served areas.

University of Virginia President John Casteen put it this way:

I think it is important that this legislation ties our increased autonomy to the state's goals for higher education. This link brings responsibilities we all share. The goals include the University's commitment to access and affordability in higher education; a broad range of academic programs; high academic standards; uniform articulation agreements with community colleges; stimulation of economic development; increase in externally funded research; and partnerships with local K-12 schools in order to improve student achievement (Casteen, 2005, p. 2).

A State interest in the Restructuring Act was consistently promoted by Virginia's Governor Mark Warner. In a statement released to announce the governor's amendments to the legislation, the governor asserted the importance of continuing State

influence over Virginia higher education. Most of the governor's justifications for his support of the Restructuring Act stressed those elements of the bill that enhanced State goals and generated public goods, rather than market or institutional interests. He wrote,

This bill is the most sweeping change in our outstanding system of public higher education in decades. In the effort to provide colleges and universities with more predictability and flexibility, we have worked to ensure that Virginians see tangible benefits, like improved access, affordability and quality. And in return for additional autonomy from the state, the institutions must remain committed to enterprise-wide government reforms, especially helping the state leverage its purchasing power and manage information technology in the most cost-efficient way (Warner, 2005).

Throughout his amendments the governor stressed the importance of a variety of State goals and the continuing need for oversight of institutional efforts to meet those goals. He made specific mention of the continuing need for the institutions to contribute to the redress of inequality in the Commonwealth, to focus economic development efforts on "distressed areas" and to preserve the rights and options of institutional employees.

Another example of the State role in the restructuring contest emerged from the evolution of the coalition of colleges and universities seeking greater autonomy in this case. The initial effort of the three most prominent public universities in Virginia to negotiate directly with the legislature in order to become political subdivisions of the Commonwealth rather than state agencies was not successful. It was only after the three agreed to collaborate on a process of negotiated autonomy that incorporated all of the Commonwealth's public postsecondary institutions that agreement was reached. This suggests that despite the efforts of flagships to maximize their individual contributions to State goals, to maximize their individual excellence and rankings as they compete in prestige hierarchies, in the case of Virginia, all public institutions remain nested in a State postsecondary project that incorporates all of the Commonwealth's 39 public Institutions in collective action.

The Institutional Estate in the Restructuring Contest

Many aspects of the Restructuring Act, particularly in the arena of changes to procedure and policies, can be seen as meeting the goals of the institutional estate. Examples include those provisions enabling the institutions to capture the interest on tuition payments (a revenue stream that had previously gone to the Commonwealth), to garner greater authority over new employee compensation plans and to be exempted from a number of state regulations over technology planning.

The concept of increased autonomy leading to higher levels of institutional excellence was widely invoked during the contest, particularly in reference to research. This language from the six-year plan prepared by Virginia Tech under the

provisions of the Restructuring Act is representative of the discourse on institutional excellence:

To be successful in enhancing its state, national and international impact, the university will have a cluster of programs that are considered to be among the best in the world. Sustaining this level of excellence requires a high level of investment. Quality is as crucial as scale of activities. As such, one of Virginia Tech's goals is to be among the top research universities in the nation. These institutions possess a critical mass of resources and have research programs growing at an above average rate. Universities with large-scale research programs are able to quickly take advantage of emerging opportunities. They also have the ability to assume greater risk and achieve a greater potential for substantial return on investment (Virginia Tech, 2006, p. 1).

Nonetheless, at the heart of this contest there was a tension between greater authority for the institutional estate and State demands for oversight. While the three institutions that instigated the Restructuring Act are well positioned to garner Level III autonomy, it is clear that they did not gain the degrees of freedom from State control that they would have preferred. As William and Mary faculty member and higher education scholar David Leslie explained it, "What we didn't anticipate... was the rather hard bargain...that Governor Warner drove that said, 'Now wait a minute, you really are public institutions, and in order to get this kind of freedom, it's not just a matter of less money, it's a matter of, will you do what the state wants?'" (Couturier, 2006, p. 44).

The Singular Referent and Authority Relations

The analysis of the Virginia case also points to a complexity of interests that goes beyond the basic categories presented in Clark's triangle of coordination. Slaughter and Rhoades (2004) suggested that the metaphors used to describe higher education institutions generally conceptualize a single entity: "the referent, after all, is 'the' organization, with clearly defined boundaries. There is little, if any, consideration of subunits and groups within the organization, or of their multiple connections with various units and groups outside of the organization" (2004, pp. 8–9).

A fragmentation of the basic elements of Clark's triangle emerged early in the negotiations over Virginia restructuring. Within the postsecondary institutions there were divergent standpoints on the appropriate balance of oversight and autonomy. The U.Va. Faculty Senate sought assurances that the university would preserve its public purposes as it gained greater autonomy. By resisting elements of the original charter legislation, some members of the U.Va. staff were effective in helping to shape the conditions regulating staff benefits and retirement agreements under the Restructuring Act. Through arguing for long-term commitments to affordable tuition, students across the Commonwealth turned attention to the need to keep public institutions accessible to students with diverse levels of family income. In a similar manner, shifting alliances and coalitions within the Virginia

legislature shaped the negotiations and passage of the Restructuring Act. The lack of nuance within each single referent, State, market or institutional estate should guide future analyses of this case, as individual departments, research centers and professional schools within the institutional estate, political and interest group coalitions within the State and a variety of market competitors seek to shape the implementation of the Restructuring Act.

The Virginia case also points to the importance of the context in which the negotiations take place, as path dependence, discourse and context shape the terrain of contest. The efforts of the State in the Virginia case were conditioned and shaped by factors as unique as the complex history of inequality in the Commonwealth and the demands emanating from the newly emerging technology corridor of Northern Virginia.

Much of the literature emerging from this case has focused on whether the institutions “succeeded” or “failed” in their efforts to gain greater autonomy. That question will not be answered for some time, yet the codification of a dozen state performance requirements does raise the possibility of the Restructuring Act leading to greater State control over the institutional estate than existed prior to the negotiations. Schugurensky argues that the future holds less autonomy for public postsecondary institutions rather than more:

Thus I submit that a more comprehensive account of current changes in higher education can be found in the transition from an autonomous to a heteronomous university (Schugurensky, 1999). Etymologically, autonomy is the quality or state of being independent, free and self-directed, whereas heteronomy refers to subjection to external controls and impositions—that is, subordination to the law or domination of another. The heteronomous university results from a combination of two apparently contradictory dimensions: *laissez-faire* and interventionism. In the heteronomous model the university agenda is increasingly conditioned by market demands and state imperatives (2006, p. 306).

Revisiting the Triangle of Coordination

The case of Virginia restructuring calls for a more nuanced view of authority relations than is provided in the original triangle of coordination. Rather than thinking of the State and market on a continuum, as Clark conceptualized, the market and the institutional estate can more usefully be seen as nested within the State, neither controlled by nor fully controlling any other. It is essential, following Gramsci, to conceptualize the State, the market and the institutional estate in constant contest, in a hegemonic struggle without simple resolution. Consistent with models of contested State negotiations, in the Virginia restructuring contest the State was an actor as well as an instrument of contest. The State in this case acknowledged the legitimacy of institutional and market interests on many dimensions as it pursued its own goals. Figure 2 suggests the dynamic tension between the three forces, each entwined with the others in a fluid process of co-existence and negotiation.

Theda Skocpol argued some 20 years ago for “bringing the state back in” to the study of social change. The case of Virginia restructuring serves as a powerful

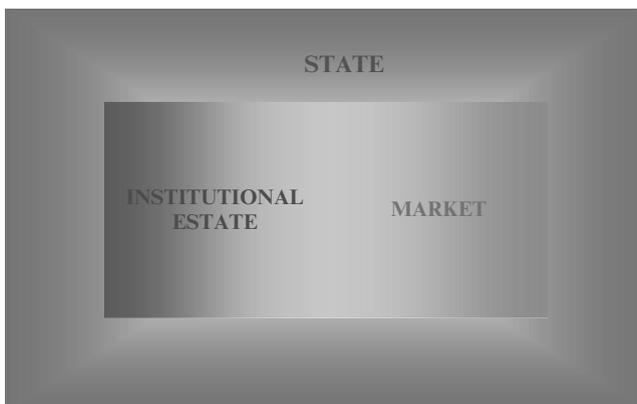


Fig. 2 Authority relations in the contested state

reminder that as we build on Clark's prevalent model of coordination in higher education we should be mindful to bring the State as both instrument and actor to the fore of new models of authority relations. In the case presented here the State, the market and the institutional estate are located together in an orbit of contest and negotiation. Yet contemporary postsecondary research and scholarship increasingly turn attention to the market and the role of elite institutions in order to understand the changing dynamics of higher education. Future researchers on postsecondary authority relations will benefit from Clark's foundational work and by moving beyond his conceptualization to incorporate the fluid dynamic of negotiations in the contemporary contested State.

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Interests, Information, and Incentives in Higher Education: Principal-Agent Theory and Its Potential Applications to the Study of Higher Education Governance

Jason E. Lane and Jussi A. Kivisto

How do governance structures impact university actions? Why does it matter if a governance structure is centralized or decentralized? How does an institution respond to a governor and legislature with differing higher education agendas? Why are some campus activities politically significant while others go unnoticed? Is a university more responsive to a government that provides annual appropriations or students who are paying an increasing portion of university expenses? While some scholars (e.g., Lowry, 2001; Nicholson-Crotty & Meier, 2003; Payne & Roberts, 2004; Toma, 1986, 1990) have provided evidence that suggests the way in which governance structures are organized can impact policy outputs, theoretical explanations for this finding have been modest.

Indeed, the study of the relationship between higher education institutions and governments has long lacked a systematic and theoretical foundation (McLendon, 2003).¹ In part, scholarship of higher education politics has given little attention to understanding how the external political bureaucracy that governs colleges and universities actually operates and how that operation influences institutional activity.² Of late, however, a small set of researchers have been integrating principal-agent theory (aka agency theory, principal-agency theory) into the study of higher education governance, accountability, and oversight (e.g. Kivisto, 2005, 2007; Lane, 2003, 2005, 2007; Nicholson-Crotty & Meier, 2003; McLendon, 2003; McLendon et al., 2006; Payne, 2003; Payne & Roberts, 2004). Principal-agent theory (PAT) provides common assumptions for investigating the role of individual and organizational interests, information flows, and incentives in higher education administration

¹Readers should note that our discussion relates primarily to the general relationship between governments and public higher education institutions. Throughout the chapter, we use such terms as university, college, and higher education institution interchangeably to represent all public postsecondary institutions. In addition, while our examples are primarily drawn from the US and Europe, as that is the focus of current work in the field, the PAT can be applied to many government-higher education governance arrangements.

²Notable exceptions include the work of Ferris (1991), Gourdrian and DeGroot (1990), and Toma (1986, 1990) who were among the first to introduce a neo-institutional perspective to the study of higher education governance; however, their work was largely unnoticed by mainstream higher education governance scholars.

and governance. This chapter provides higher education scholars with an introduction to PAT, explores the divergent currents in its emerging use in the higher education field, and suggests new questions to further understanding of the governance process and policy implementation.

PAT focuses on the relationship between entities, either individuals or organizations, and can be used to understand motivations behind the activities of actors within hierarchical and contractual relationships. Among other areas of inquiry, the PAT can be useful for investigating and explaining why universities respond to legislative action in different ways, the impact of competing demands from different government officials on the decision making of institutional officials, and how bureaucratic governance arrangements can alter policy effectiveness and institutional autonomy.

Governments have long valued the societal contributions of colleges and universities and have used their resources to support these hallowed centers of learning. Those institutions that operate in the public sector, whether begotten through constitution, statute, or charter, were made in order to fulfill the educational needs of the citizenry. As such, these institutions often fall subject to oversight and regulation by the government. The structures that govern these institutions, particularly in how the institution relates to its sponsoring government, vary between states and nations; however, in every case there exists an underlying assumption that the institution, in some way, is responsible to the government. Edwin Duryea (2000), a historian of higher education governance, has noted that in the US, “Public boards have a direct responsibility to authorities of the state government that supports them and are subject to its executive and legislative governments—although governors and legislators traditionally have acceded to them substantial independence and, as a rule, have not meddled directly into internal affairs” (p. 3). In Europe, the relationship between the institution and the government has been even closer. National, federal and local governments in various European countries have traditionally had a dominant and direct role in governing and funding the public universities. Within the context of the US higher education system, Dunn (2003) discusses the tensions between increasing calls for accountability by external stakeholders and the ever-present expectation for autonomy and professional deference by internal stakeholders. He suggests that, “The conceptual problem centers on the necessity that non-elected public sector personnel, including ... administrators and faculty, be simultaneously empowered (by the definition of their responsibility, both objectively and subjectively) and constrained (through mechanisms of accountability that then feed into definitions of responsibility)” (p. 73). This tension is one of the classic dilemmas at the heart of the principal-agent framework: how does one empower an agent to fulfill the needs of the principal, while at the same time constraining the agent from shirking on their responsibilities?

Public colleges and universities operate as public bureaucracies, at least in part responsible to the governments that fund them and endow them with the power to grant degrees. In many nations there is a shift away from government spending on higher education, but a continued interest in ensuring those institutions remain accountable to the government. Specifically in the US, even though states now fund smaller proportions of institutional budgets than in the past, state governments

continue to exert substantial influence over post-secondary policy development, institutional decision-making, and governance organization. Literature focusing on the external politics of higher education (e.g., Doyle, 2006; Doyle et al., 2005; Hearn & Griswold, 1994; Hicklin & Meier, 2004; McLendon et al., 2007; McLendon et al., 2006; McLendon et al., 2005; Knott & Payne, 2004; Lowry, 2001; Nicholson-Crotty & Meier, 2003; Payne & Roberts, 2004; Toma, 1990) suggests that the structure of higher education governance impacts policy outputs and institutional decision making. Such findings resonate with the growing political science literature that utilizes “new institutionalism” perspectives founded upon rational theories of politics that “deemphasize the dependence of the polity on society in favor of an interdependence between relatively autonomous social and political institutions” (March & Olsen, 1984, p. 738). Evidencing the interactive role of external actors in higher education governance, Gittell and Kleiman (2000) concluded in their study of higher education political contexts:

Public universities are not above and apart from politics. ... Political leaders, particularly the governor and top elected legislative representatives, play a significant role, often dominating design and implementation and sometimes frustrating policy reforms. (p. 1088)

Political theories derived from neo-institutionalism provide a theoretical foundation from which to study how government structures allow or inhibit actors such as political leaders to influence public bureaucracies like universities.

Similar to other public bureaucracies, public colleges and universities operate in an environment of hierarchical control and information asymmetry. Created, or at least funded, by governments to perform particular functions, colleges and universities serve as agents of the state (or nation). These agents have historically been allowed a high degree of autonomy and freedom from direct legislative control (Duryea, 2000). This freedom derives partially from the highly professionalized nature of academia, with faculty and administrators viewed as experts (see Mintzberg, 1979 for a more in-depth discussion of the characteristics of a professional bureaucracy).³ This expertise creates a knowledge imbalance, as it is usually not possible for politicians or other actors in the governing structure to monitor and assess whether faculty and administrators operate in the best interest of the government, the institution, or the individual (assuming that these interests differ). Further exasperating the issue, the highly specialized nature of academic work and the complexities in the organizational structure (e.g. Clark, 1983; Birnbaum, 1988; Holtta, 1995) and production technology (e.g. Bowen, 1977; Johns & Taylor, 1990; Cave et al., 1997) often create favorable conditions for high levels of information asymmetry.

³Even though trust in the academia has decreased in the last several years, the information asymmetry caused by faculty expertise still exists. External stakeholders may use indicators such as graduation rates to determine compliance with principal goals, but this does not mean they have ability to assess such things as faculty use of time (e.g., to what extent does writing a book impact student learning?).

In light of these dynamics, a handful of scholars have used the PAT to model, study, and understand the functions of higher education governance systems. In general, PAT describes the relationship between two or more parties, in which one party, designated as the principal, engages another party, designated as the agent, to perform some task or service on the behalf of the principal (e.g. Ross, 1973; Moe, 1984). PAT has been considered relevant in different kinds of agency relationships where there exists goal conflict between the parties of a relationship and informational asymmetries favoring the agent. These two conditions activate the possibility of a moral hazard problem known as “shirking”.⁴ One of the main purposes of PAT is to solve this shirking problem (i.e., to find instruments that will motivate the agent to behave in the principal’s interests). Although the traditional forms of PAT have focused on the relations between individuals, the applicability of the PAT has proved to be relevant at the group and organizational level as well (e.g. Ferris, 1991; Braun, 1993; Lassar & Kerr, 1996; Moe, 1990, 2005). Both theoretically- and empirically-oriented research conducted by scholars of different disciplines can be found in increasing numbers. PAT is not and has never been the exclusive property of a certain scientific paradigm; rather, it has been and could be a useful theoretical framework for many different disciplines and approaches (Kivisto, 2007).

As public bureaucracies, public colleges and universities are replete with principal-agent relationships, both internal and external to the institutions. This chapter examines how the principal-agent framework applies to the higher education setting (primarily external to the institution) and possibly reframe how both scholars and practitioners assess governance operations. In particular, the chapter begins with an overview of the economic and political science origins of PAT, focusing on the importance for scholars to be aware of how differing assumptions of the two disciplines impact adaptation of the model to different organizational settings. The chapter then reviews existing work that incorporates PAT in higher education studies, discusses application of the theory to higher education, and explores potential applications for future work.

Overview of the Principal-Agent Relationship

Originating in the study of economics, the principal-agent framework is based upon a basic contractual relationship in that a principal contracts with an agent to engage in certain functions that will improve the status of the principal relative to the status quo (Alchian & Demsetz, 1972; Jensen & Meckling, 1976). Examples of such a

⁴Shirking in the principal-agent literature is defined as the action of evading one’s work or pursuing one’s own goals in lieu of the principal’s (Fiorina, 1982). Shirking in this context may be either passive or aggressive. It may mean that the agent advertently fails to pursue the goals of the principal or purposefully engages in actions not in line with the goals of the principal.

relationship include: patient-doctor, investor-broker, client-lawyer, and employee-employer. In such relationships, the premise is that the principal does not have enough time, knowledge, and/or energy to fulfill all of its own needs in an adequate fashion. As such, the principal contracts with an agent, usually one with the necessary time and specialized skills, to act on behalf of the principal. In its most basic form, this model suggests the concept of a market where decisions concerning the allocation of resources are made by a delegate or representative of the resource owner (Whynes, 1993). The agent is trusted to make decisions that are in the best interest of the principal. However, agent preferences derived from self-interest and self-preservation do not always ally with the preferences of the principal. The potential, and likely, difference in principal and agent preferences calls for the principal to provide incentives and monitor agent behavior to ensure compliance with “the contract.”

According to Moe (1984), “The logic of the principal-agent model ... immediately leads us to the theoretical issues at the heart of the contractual paradigm: issues of hierarchical control in the context of information asymmetry and conflict of interest” (p. 787). The model is based upon the rational assumption that an individual prefers to pursue self-interest before the interests of others. Therefore, the contractual paradigm requires the principal to ensure the agent acts in the best interest of the principal, particularly given the fact that the agent’s specialized abilities and knowledge advantage the agent in using the principal’s resources to pursue ends that benefit the agent (Shepsle & Boncheck, 1997; Ortmann & Squire, 2000). The principal must utilize an array of oversight, compensatory, and punitive initiatives to ensure the agent acts in the principal’s best interest. Provision of compensation to the agent, should mean the principal has the right to expect a minimum level of utility from the agent in exchange for the compensation (Sobel, 1993). Yet, there is still no guarantee that the agent will not shirk on its responsibilities to the principal.

In a rational world, “[a]gents relentlessly exploit every opportunity to ease their work burden, as long as the principals do not react and punish them so severely that their net utility from shirking is decreased” (Frey, 1993, p. 663). Given this expectation, it is assumed that the principal does not only need to consider instituting various oversight mechanisms, but also must have the means to alter the actions of the agent when shirking exists. When shirking is reported to the principal and verified, the principal takes action either by limiting or eliminating compensation or initiating some sort of punitive action to entice or force the agent to alter its actions. An important part of the relationship is that fear of the corrective actions of the principal may be enough of a motivation to prevent or decrease the agent’s shirking. So, while one may not witness the agent altering its actions in response to the principal’s demands, this lack of action does not mean that the relationship is absent of oversight mechanisms or that methods of control do not exist (LaFollette, 1994). It may, in fact, represent an almost perfectly balanced principal-agent model, where there is just enough incentive to limit agent shirking to a level of non-concern to the principal.

To ensure that the principal receives the appropriate return on its investment from the agent, the principal establishes oversight mechanisms. However, political science and economics portray these oversight mechanisms in different ways. From

the vantage of political science, governments employ a range of oversight tools to ensure that the bureaucratic agents pursue legislated goals. McCubbins and Schwartz (1984) famously suggested that government oversight can be divided between “police patrols” and “fire alarms.” Police patrols are direct and centralized and tend to be in operation regardless of whether an agent is believed to be shirking or not. In higher education, police patrols include annual reports, purchase approvals, performance audits, and other forms of required reporting (Lane, in press). Comparatively, a fire alarm is “... less centralized and involves less active and direct intervention than police-patrol oversight;... [a legislature] establishes a system of rules, procedures, and informal practices that enable individual citizens and organized interest groups to examine administrative decisions (sometimes in progress), to charge executive agencies with violating [legislative] goals, and to seek remedies from agencies, courts, and [the legislature] itself” (McCubbins & Schwartz, 1984, p. 166). In essence, these fire alarms rely largely on non-governmental actors to oversee the activities of bureaucratic agents and sound an alarm should shirking be observed. Lane (in press) found state governments to monitor university behavior through a web of oversight that, in addition to typical direct mechanisms (e.g., purchase approvals, program reviews, budget reviews, etc.), also includes such indirect mechanisms as investigative reports by the press, communiqué from constituents, and legislative hearings where individuals can raise concerns about an institution’s activities. Upon learning about a potential shirking activity, the legislature may engage in a more formal investigation.

In terms of oversight, the economics PAT focuses more on the type of behavior to be overseen rather than the mechanisms used to oversee the behavior. In particular, economists make a distinction between “behavior-based contracts” and “outcome-based contracts” (Eisenhardt, 1989). When choosing behavior-based contracts the principal chooses to monitor agent’s behaviors (actions) and then reward those behaviors. The basic idea behind monitoring behavior is to decrease the information asymmetry between the principal and the agent. In some situations, the monitoring procedures may be too expensive or difficult to be worthwhile or violates some agents’ expectation of professional autonomy. In these situations, the other option, namely outcome-based contracts, could be a more logical choice for the principal. As the name implies, outcome-based contracts compensate agents for achieving certain outcomes. As a concrete example, reward schemes such as performance-based (or merit-based) salary structure can be considered as forms of outcome-based contract. Outcome-based contracts are considered to be effective in curbing the possibility of an agent acting in an opportunistic way. The rationale is that such contracts are likely to reduce goal conflict because they motivate the agent to pursue outcomes that are incentive compatible with the principal’s goals (Eisenhardt, 1989; Bergen et al., 1992).

No matter how it is constructed or codified, oversight is the lynch pin of the PA relationship; for without it the agent has little incentive to pursue the goals of the principal and the principal has no means to ensure that its goals are being pursued by the agent.

The Emergence of Principal-Agent Theory⁵

PAT derives from the development of neo-institutionalism, which emerged in reaction to shortcomings identified in both neo-classical and behavioral approaches to studying organizations (Moe, 1984; Powell & DiMaggio, 1991). The neo-classical (or “old institutionalism”) view of organizations centered around the “entrepreneur, a hypothetical individual who, by assumption, makes all decisions for the firm and is endowed with a range of idealized properties defining his knowledge, goals, and computational skills and transaction costs” (Moe, 1984, p. 740). As such, aspects of individual choice, environmental contexts, and goal conflict are assumed away. In response to the neo-classical school of thought, behaviorists centered on individual choices and often viewed organizations as a collection of individual processes. One major criticism of behavioral models is that they neglected the fact that “social, political, and economic institutions have become larger, considerably more complex and resourceful, and *prima facie* more important to collective life” (March & Olsen, 1984, p. 734).

New institutionalism developed as a way to incorporate theories about the power of institutional structures with theories about the power of individuals. Humans purposefully designed social institutions to help structure the world in which they operate. These institutions subsequently both constrain and structure individual behavior. For example, colleges and universities evolved as a way for society to preserve and transmit knowledge. Now, the structures within universities clearly impact individual and collective behavior of faculty, staff, students, and administrators (see e.g., Cohen et al., 1972; Ortmann & Squire, 2000). The focus of new institutionalism, as applied to higher education, includes understanding the influence of organizational structure on individual action and decision making behavior.⁶ Further, institutions structure the nature of the relationship between individuals and organizations, empowering and subordinating various actors and groups. Moe (1984) describes this amalgamation of the power of the organization and the power of the individual as two-way authority. While bureaucratic structures purposefully create power imbalance between actors, the extent of one actors’ authority over another actor is limited by a “‘zone of acceptance’, within which [the subordinate actor] willingly allows the [other actor] to direct his behavior” (p. 745).

One theoretical strand to emerge from neo-institutionalism was PAT, which accounts for both actor motivation (e.g., self-interest) and the role of organizational structures in constraining that behavior. After its birth, the development of the main-

⁵This section provides only a brief overview of the major aspects of the evolutionary pattern of new institutionalism, primarily in the context of economics and political science research. New institutionalism has had significant impacts on the study of organizations in other fields such as sociology, organizational theory, and history. While basic concepts remain the same, each field has developed various sets of assumptions and goals associated with new institutionalism. See Powell and DiMaggio (1991) for a comparative discussion of new institutionalism in political science, economics, and sociology.

⁶One of the classic applications of new institutionalism to higher education is Cohen et al.’s (1972) “garbage can model” explanation of university decision making.

stream principal-agent research in economics has developed along two lines, which are usually referred to as “positive theory of agency” and “principal-agent” (Jensen, 1983; Eisenhardt, 1989). The two streams share a common unit of analysis, the contract between the principal and the agent, as well as some of the common assumptions of the theory. Nevertheless, the two streams also differ in many respects. The principal-agent literature is generally more abstract, mathematical and non-empirically oriented. Characteristic of formal theory, the principal-agent stream involves careful specification of assumptions, which are followed by logical deduction and mathematical proof. The main focus is on determining the optimal form of the contract. The other stream, the positivist literature, is generally non-mathematical and more empirically oriented. Positive researchers have focused more on identifying situations in which the principal and the agent are likely to have conflicting goals and then describing governance mechanisms that limit the agent’s self-serving behavior. Positive researchers have also focused more exclusively on the intra-organizational principal-agent relationships, especially shareholder-manager relationships (Jensen, 1983; Eisenhardt, 1989). Although the differences between the two streams are notable, the streams can also be seen as complementary to each other: whereas positive theory may identify the behavior of the agent and various contract alternatives available, the principal-agent stream may indicate which contract is the most efficient in a given situation (Eisenhardt, 1989).⁷ The higher education literature applying economics PAT has not made analytical distinction between the two streams. This is because the majority of previous studies have treated the PAT primarily as conceptual framework to be used for illustrative purposes, not as a theory which should be modelled mathematically or tested empirically.

The economics PAT has been considered especially valuable in re-establishing the importance of incentives, interests and information in organizational thinking. It assumes that, whether we like it or not, much of organizational life is based, at least partly, on people’s self-interest, opportunism and goal conflicts. In addition, the theory has drawn attention to the issues related to information, and especially the asymmetries of information (Eisenhardt, 1989; Petersen, 1993).

Application of PAT to public bureaucracies and other political entities follows the basic tenets of the economic model discussed above; however, due to differences in the administrative and governance structures of private firms/corporations and government bureaucracies, aspects of the model need modification and further elucidation in order to be useful in the political context. As Miller (2005) observed in his review of the use of PAT in political science, “principal-agency has been

⁷The positive theory of agency seems to have connected to a broader body of theoretical work known as ‘Organizational Economics’ (see, e.g. Barney & Ouchi, 1986; Donaldson, 1990; Barney & Hesterly, 1996). Organizational Economics (OE) is composed of transaction cost economics (see Coase, 1937; Williamson, 1975, 1985) and property rights literature (Alchian & Demsetz, 1972). Although some other contributions of OE exist (see Barney & Hesterly, 1996), PAT and transaction cost economics are clearly its best known components. As the name implies, OE basically applies different economic models and assumptions to the field of organization studies (Kivisto, 2007).

substantially challenged, modified, and even turned upside down in order to accommodate the distinctly political aspects of several key Weberian asymmetries” (p. 203). Usage of PAT in the public realm aids in identifying and understanding the complex relationship among the various actors involved in public bureaucracies—structures filled with a vast array of oversight, purposeful and de facto autonomy, and intertwined lines of hierarchical structures not found in most private sector companies and thus largely excluded from economic models. The theory has most frequently been used to model legislative (e.g., McCubbins & Schwartz, 1984; McCubbins, 1985; McCubbins et al., 1987; Wood, 1988; Wood & Waterman, 1991) and executive (e.g., Moe, 1985) oversight of the bureaucracy; but it has also been used in the study of the President’s relationship with voters (Downs & Rocke, 1994) oversight of police officers (Brehm & Gates, 1993), congruence between Supreme Court decisions and the subsequent rulings of lower courts (Songer et al., 1994), and the relationship between a regulatory agency and the non-governmental entities that it regulates (Scholz, 1991).

Mitnick (1980) first recognized the value of using the PAT to study public bureaucracies; however the theory did not begin its move toward the mainstream until about four years later when several articles sought to apply the PAT to the study of political institutions. Weingast and Moran (1983), Weingast (1984), and McCubbins and Schwartz (1984) used the principal-agent assumptions of information asymmetry and agent outcomes to reinvent the study of Congressional oversight. They posited that even though Congress did not constantly monitor the activities of bureaucracies, this did not mean that Congress was shirking on their regulatory responsibility (which is what many scholars of the time were concluding). Instead, Congress employed a combination of direct and indirect oversight, along with different forms of incentives, to retain control over bureaucratic outputs.

Moe (1984) and March and Olsen (1984) provided a broader discussion of the theories application to political sciences. These articles discussed how the behavior within political structures may not simply be studied as an accumulation of individual preferences and choices, but also a result of organizational structures. Moe’s (1984) classic overview, “The New Economics of Organization” elucidated the application of the PAT to political models through an extensive comparison of political and economic organizations. Moe suggested that the entire governmental enterprise is based on the contractual paradigm (e.g., voters contract with elected officials, elected officials contract with bureaucrats, public governing boards contract with CEOs, etc.), thus postulating (and in some cases illustrating) the ubiquitous existence of agency problems throughout public bureaucracies. Noting the contractual foundation, Moe went on to observe that PAT can be used to explain various aspects of government bureaucracies: policy products, bureaucratic influence, oversight, control, shirking, and information asymmetry.

Almost immediately, a new field of research was “sparked” in political science. As Miller (2005) concludes:

For the first time, the field of public bureaucracy had a research agenda that was based on deductive theory and demanded the highest level of methodological competence. At the same time, the empirical results suggested a more complicated story—one that led to

challenges to the canonical model and opened the door to reformulations of PAT that better fit this important political relationship. (p. 209)

In much the same way that PAT prompted political scientists to take a different look at oversight and accountability, the theory has the potential to further and reframe current understanding of the governance and policy making of public higher education.

Comparison of Perspectives: Economics vs. Political Science

Due to the divergent development of PAT in different disciplines, application of the theory to higher education governance and policy has been somewhat disjointed as scholars using the same “theory” utilize different assumptions based on disciplinary perspective. To help scholars better understand the use of PAT in higher education research, this section provides a comparison of the differing assumptions used by political scientists and economists.

Political and economic PAT both developed as part of the growth of new-institutionalism and attempt to predict how actors and organizational structures behave in hierarchical and quasi-hierarchical situations. Much like the economic applications, PAT in political science investigates the role of incentives, interests and information in organizational thinking. Certain assumptions regarding agent desires to shirk on responsibilities and the need for the principal to provide oversight and incentives to reduce agent shirking remain fairly constant between applications. However, a number of key differences do exist. Moe (1990) argues that the two primary differences between economic and political models can be found in the construction of the principal and the type of output produced by the agent. Political principals tend to be comprised of collective entities that produce a single contract (e.g. voters collectively electing a representative or the members of Congress creating and funding a bureaucracy) and multiple entities that create multiple contracts (e.g., the legislature and the governor placing different demands on higher education). Likewise agents can be comprised of: (1) collective entities that work together to produce an output, which typically resembles a public good (rather than a more easily measurable output such as a private consumable or corporate profit); or (2) multiple entities responding to the same principal such as when several institutions are governed by a single board.

Comparing the two disciplinary perspectives reveals a number of other critical theoretical differences in how economists and political scientists apply PAT in their respective fields. (Table 1 provides an overview of these differences.)

Contract

Traditionally, economics PAT has considered PA relationships primarily as codified contractual relationships. For this reason, economics PAT usually understands contracts as more formal and explicit instruments for enabling the economic co-operation

Table 1 Differences between PAT assumptions in economics and political science

	Economics	Political science
<i>Contract</i>	Explicit	Implicit
<i>Unit of Analysis</i>	Principal	Principal/agent
<i>Actor Motivation</i>	Economic utility	Economic utility and political power
<i>Principal-Agent Relationships</i>	Bilateral	Multilateral
<i>Principal's Primary Mode of Control</i>	Economic contract	Social/political contract
<i>Output</i>	Private good	Public good
<i>Source of Shirking</i>	Individual	Individual or structural

between the principal and the agent.⁸ According to Perrow (1986), PAT “assumes that social life is a series of contracts ... specifying what the agent should do and what the principal must pay in return” (p. 224). Political science also views the relationship as a contractual one, but that contract can also be a vaguely defined agreement between two autonomous or semi-autonomous entities with varying levels of expertise. In fact, while the economic contract typically stipulates what is to be produced, leaving the “how” of production to the expertise of the agent; public bureaucracies often retain an information asymmetry in both how best to produce a policy output and what that policy output should look like. For example, a public university operates under the auspices of a contract with the state in that the state appropriates money to the institution with the expectation that the institution contributes to the public good through teaching, research, and service. In some cases, the state even provides some guidelines about the expected output (e.g., establishing performance measures or funding specific types of research activity); however, how those outputs are achieved are usually left up to relevant administrators or faculty members because of their expertise. This expertise “gives bureaus (agents) strategic opportunities” (Bendor et al., 1987, p. 1041) not typically observed in relationships regulated by economic contracts.

Unit of Analysis

Economics PAT gives conceptual priority to economic aspects of the principal-agent relationship by investigating and analyzing the agent’s shirking behavior and the principal’s means to overcome it. In this sense, the economics PAT is primarily

⁸The contract was the central concept for the early PAT theorists because it distinguished PAT from classical and neoclassical economics, in which market forces act as a disciplining mechanism on the owner/entrepreneurs who actively manage firms (Tosi et al., 1997). However, inside the various approaches of economics PAT there exist different ways to understand the nature of the contract. Some scholars including Eisenhardt (1989) and Bergen et al. (1992) have seemingly interpreted the contract to be more like a “metaphor” of a PA relationship, not as a specific and detailed construct that should be rigorously operationalized.

“principal’s theory” since it takes the perspective of securing the principal’s welfare against potential or actual agent shirking. While shirking and oversight are central to political science PAT as well, political scientists investigate the welfare of both the principal and the agent. Given that it is much more difficult to exchange political agents, recognizing and understanding the impact of a PA relationship on the agent (e.g., politician or a public bureaucracy) is much more important in political science than economics.

Principal-Agent Relationships

Economics PAT understands and examines relationships as bilateral relationships between one principal and one or more agents. Influenced by the assumptions common to rational choice and methodological individualism, it assumes a homogenous incentive structure from the principal. In political science, two significant departures from economics are generally acknowledged: (1) political PA relationships often involve multiple and collective principals (Bendor & Meirowitz, 2004; Moe, 1990; Lyne & Tierney, 2003); and (2) there can exist intermediary principals/agents between a primary principal and agent. In the first distinction, multiple principals act independently of each other and can create heterogeneous incentive structures, sometimes forcing the agent into scenarios not noted in economics, such as the agent having to choose between competing contracts. Also, studies of collective principals (e.g., governing boards) investigate sources of real power. For example, what is the functional difference between boards with unanimous or split votes? Does the power of the Board chair impact the operation of the principal? In the second deviation from economics, political scientists recognize that hierarchical structures can create long chains of principals and agents. These PA chains can create different agency problems than exist in a bilateral relationship.

Actor Motivation

Both economics and political science PAT considers the principal and the agent as self-interested utility maximizers. Therefore, given the choice between two alternatives, the rational principal or agent is always assumed to choose the option that increases its individual utility (Davis et al., 1997).⁹ However, as Waterman and Meier (1998) observe, “In the marketplace, principals and agents clearly have different goals and/or preferences. Obviously agents want to make as much money as possible while principal’s want to pay as little as possible for services ... in the bureaucratic

⁹The utility maximization assumption is especially important for mathematically oriented principal-agent researchers, because it allows different situations to be modeled and predicted mathematically in a way that would not be otherwise possible (Hendry, 2005).

setting, with a focus on policy and process instead of profit, goal conflict may not always exist between principals and agents. Principals and agents may disagree over policy, or they may not” (p. 185). Yet, it is possible for principal and agent to agree on policy while also disagreeing over how to implement the policy.

Principal’s Primary Mode of Control

For economics PAT, ‘contract’ is understood to be an instrument enabling economic co-operation between the principal and the agent. The main purpose of the contract is to explicitly set the task for the agent, and introduce the detailed means through which the agent will be compensated for performing the task. The nature of political arrangements leads to a mode of control that is often less explicit than witnessed in relationships assessed by economic PAT. As such, while the contracts may govern economic relationships, political PA relationships can often be governed through elections, appointment of intermediary principals, power brokering, and signaling from political elites. For example, political scientists have raised questions such as whether the electorate uses elections as a type of game to select the best representative of the voters (Fearon, 1999) or a moral hazard game designed to punish politicians who fail to fulfill the desires of the polity (Ferejohn, 1986). Similar questions could be raised about how legislators use state appropriations to either reward or sanction bureaucratic behavior or governors use their power of appointment to influence board decisions.

Output

For economics PAT the output of the PA relationship is a private rather than public good.¹⁰ This means that the output is usually somehow observable to both the agent and the principal, and it could also have many facets, such as quality and quantity. It can be, for example, the number of shoes produced by a factory worker, the volume of sales generated by a department store salesperson, the success of a surgical procedure, and so forth. Governments, however, are often in the business of producing public goods, making it much more difficult, although not impossible, in political science PAT to measure agent outputs (Moe, 1990).¹¹

¹⁰In the traditional sense, a ‘private good’ is a good consumed by one person which cannot be consumed by another person (i.e. exclusion feasible, private use). A ‘public good’ is a good that, even if it is consumed by one person, is still available for consumption by others (exclusion infeasible, collective use) (see e.g. Begg et al., 1994).

¹¹This is not to ignore attempts to measure university outputs though such indicators as graduation rates, exam scores, and graduate school acceptance; but there remains debate about the appropriateness of these indicators to measure institutional productivity.

Source of Shirking

Economic PAT assumes that it is the self-interested utility maximization which drives the agents to act opportunistically towards their principals (i.e. to shirk). The existence of information asymmetries further encourage the shirking activity. Indeed, the assumption and existence of agent self-interest is crucial for economics PAT. If the utility functions of self-serving principals and agents coincide, there would be no possibility for shirking to appear (Davis et al., 1997). Similarly, if the information available to both the principal and the agent were to be the same, self-interest would not matter since the principal could immediately detect any shirking behavior on the part of the agent (Ricketts, 2002). Many studies in political science also focus on shirking as defined by economists; however, some recent work has attempted to identify various gradients of shirking. For example, shirking could occur due to “slippage”—unintentional shirking. In principal-agent relationships, particularly those with long principal-agent chains, information may not be fully or accurately communicated between the primary principal and the primary agent. As such, an agent’s actions may be perceived as “shirking” when the agent actually thought it was pursuing the principal’s goals. Thus, the source of the agents behavior would be information slippage rather than self-interested shirking.

Principal-Agent Theory in Higher Education in Governance and Policy Research

As a field of study, higher education scholars often draw on the theories of other disciplines to analyze postsecondary institutions. Usually a scholar or set of scholars adapt a theory to higher education research and then others build upon and further refine the application of that theory. However, the writing using PAT in higher education suggests a somewhat spontaneous interest in PAT by scholars working on different governance questions in varying governmental contexts (e.g. a decentralized federal system such as in the US vs. a centralized system such as in Finland).

Despite its strong research tradition in economics and political science, until recently the PAT was only sparingly incorporated into the study of higher education.¹² Wider application of PAT was seemingly ignored not only by mainstream higher education researchers, but also economists and political scientists working in the higher education field. Nevertheless, a change has seemingly taken place during the last few years; authors such as Lowry (2001), Lane (2003), Liefner (2003),

¹²Previous higher education governance studies using PAT include Toma (1986, 1990) and Gourdrian and DeGroot (1990) as well as a few occasional references and some short analyses that took place in 1990s (e.g. Ferris, 1991; Braun, 1993; Williams, 1995; Massy, 1996; Geuna, 1999).

McLendon (2003), Nicholson-Crotty and Meier (2003), Payne (2003), Gornitzka et al. (2004), and Kivisto (2005) have now more thoroughly introduced PAT to the field of higher education governance and policy studies. The rapidly growing usage is a testament to the theory's utility and flexibility. However, it also means that there has been no systematic evolution of the theory in higher education.

A review of the recent work using PAT reveals two distinct tracks of analysis with about half of the authors adhering more to economic assumptions and the other half aligning more with the assumptions derived from political science. For example, Liefner (2003), Gornitzka et al. (2004), and Kivisto (2005, 2007) align with the economic origins of PAT, which Miller (2005) refers to as the "canonical" PAT as it relies on the traditional assumptions of the theory. Knott and Payne (2004), Lane (2003, 2005, 2007), Lowry (2001), McLendon (2003), McLendon et al. (2006), and Nicholson-Crotty and Meier (2003) approach PAT from a political science perspective, which tends to slacken some of the canonical assumptions as to better fit the model to the operations of a public bureaucracy. Interestingly, due to the quasi-private, quasi-public nature of most colleges and universities, both approaches further our understanding of the academic enterprise.

The use of PAT to study higher education governance began with a mostly canonical approach by a set of papers by economist Eugenia Toma (1986, 1990), who first introduced PAT to higher education politics through a study of public university governing boards. In her first analysis, Toma asked a very simple question: what factors lead to politicians' selecting a certain type of governing board structure over competing structures? Toma's (1986) analysis suggested that states in which there were minimal barriers to taxpayers' ability to influence legislative decision making tend to have less centralized boards than those states in which citizens had to overcome high barriers to political involvement. The second analysis (Toma, 1990) investigated how board type impacts the operations of public universities. She found that:

The structure of the boards is important because it helps to define the constraints on the board members and on the internal agents of the universities. An implication of this study is that public universities can be made to function more like private ones by placing them under separate governing boards. (p. 7)

Toma's initial inquiry demonstrated the utility of using PAT to study higher education governance; but the work also raised a number of important questions that only recently have scholars begun to address: (1) What factors influence the structural design of university governance? (2) How does the design of a governance structure influence policy outputs and the operations of a university?

The general conclusion that board structure impacts the operation of colleges and universities has been supported by subsequent studies. Following the work of Toma in higher education and building on the work of Horn and Shepsle (1989), McCubbins et al. (1987, 1989) and Moe (1989, 1990) in political science, several authors began investigating how governance structures impacted institutional characteristics. In particular, scholars were interested in how the organization of governance structures impacted funding—specifically, the cost of a college education to a student. The work of Bowen et al. (1997) and Lowry (2001) found evidence

suggesting that centralization of state governance leads to lower costs for students. Moving beyond the extent of centralization, Lowry's study also suggested that how board members are selected can also influence costs (i.e., elected, as opposed to appointed, boards lead to lower tuition).¹³

Essentially, these studies indicate that the way in which a board is organized and its members are selected can impact the interests of the board and the effectiveness of various incentives to prevent the board from shirking. This supports the suggestion of McLendon et al. (2006) that we should view, "governance arrangements as serving to institutionalize the preferences of different sets of stakeholders, which seek to shape policy consistent with their premises" (p. 19). For example, Lowry (2001) explained that his findings of centralized governance structures leading to lower costs demonstrated the board's responsiveness to a certain set of stakeholders. In his view, coordinating boards, which are generally appointed by either the governor or legislature, are likely to pursue the interests of elected officials and the general public (i.e., keeping tuition low and having higher levels of spending on student service). Whereas, non-consolidated boards were more responsive to internal academic stakeholders (i.e., faculty and administrators) and would have higher tuition costs and lower levels of spending on student services as to free up money for academic expenditures. Lowry's is a speculative explanation as the data did not directly assess board responsiveness, but it does demonstrate the feasibility of how a structure can impact the principal-agent relationship and, thus, board priorities and actions.

In a more recent study of American governance structures, Nicholson-Crotty and Meier (2003) investigated how the composition of a principal may impact the output of an agent. The study examines how consolidated governing boards (i.e., boards that governing more than one institution; often serving as the sole board for all institutions in one state) either mitigate or enhance the external political influences on the operations of universities. Using an array of structural and political variables, the authors ran a series of multiple regressions to determine the impacts of politics on different economic variables (i.e., cost of higher education per student; tuition per student, need-based scholarships and financial aid per student, and state/local appropriations per student). While there was not a clear set of themes across the states,

¹³One possible explanation for this finding is that the way in which a member is selected can impact that member's ability to shirk. Let us assume that the board member is an agent of those who enable their membership on the board. Let us also assume that the electorate is generally highly concerned about the cost of a higher education to the student. If a board member is elected by the public, they should be responsive to the desires of the public (the public's ability to prevent shirking is in their ability to remove or choose not to re-elect a board member with whom they are displeased). However, appointment of members removes the public's ability to directly punish shirking. In appointment situations, the board member's principal become the government official making the appointment (likely the governor). The new principal's priorities may be freeing up state funds by shifting the costs to the individual. Even though the public still prefers lower costs, it is unlikely that they would unseat a politician simply because they refused or were unable to reign in a university board. Because there is little punishment for not following the priorities of the public, there is little incentive to keep costs low.

the study did determine that the type of structure did significantly impact the influence of politics. The authors attempt to explain the complexities of their findings:

The widely varying pattern of coefficients as politics interacts with structure suggests that the relationships are highly complex. Providing an explanation for the patterns and how those patterns should appear will require additional theoretical work. One possibility is that the relationships are even more complex than the current regressions reveal them to be. For example, the direction of effect of legislative professionalism might be a function of both the structure of higher education and the ideology or partisanship of the legislature. This notion suggests a three-way or perhaps even a four-way interaction of these terms. (p. 93)

Such interaction should not be surprising as higher education governance structures contain an array of principals and agents. In an empirical study of European tertiary governance structures, Liefner (2003) attempted to identify the possible principals and agents in the context of higher education.

In higher education the principal can be a ministry of science and education, the management board of a university, a president, dean, or department chair. The agents are those actors in higher education, who receive assignments, funds, and salaries from the principals. Therefore, a number of higher education managers, for example, heads of departments, are simultaneously principals and agents, whereas most of the professors, researchers, and lecturers can be viewed primarily as agents. (p. 477)

The findings of the Nicholson-Crotty and Meier (2003) and Liefner (2003) studies support Toma's (1990) and Lowry's (2001) premise that any theory of higher education governance cannot merely account for the existence of principals, but rather must also account for the composition of those principals.

The complexity, however, is not limited to the operation of multiple principals, but is in part due to the operation of different types of principals. Building on the work of Moe (1990) and Lyne and Tierney (2003), Lane (2005) argued that the impact of a governance structure is difficult to explain because such structures are not standard hierarchies, but contain up to three different types of principals: single, multiple, and collective. A single principal is that typically described in the PAT and often the focus of economic analysis. A multiple principal relationship involves more than one single principal, each of which having separate, independent contracts with the agent. A collective principal is where there are multiple members of a single principal, such as a governing board. The governing board acts as a single entity, but is actually comprised of multiple members. The existence of more than one principal can create competing goals, confusing the agent and leading to inconsistent outcomes. Failure to recognize the existence and operation of complex principals could lead to a misinterpretation of actor motivation and behavior.

Lane (2003, 2007) also found that the governance arrangements can impact the type of oversight used by principals. Drawing on the political science literature (e.g., Moe, 1984; Ogul & Rockman, 1990), he employed the PAT as a conceptual framework for investigating how states engage in oversight of public higher education. Using a comparative case study approach, the study uncovered that universities operate in a "spider-web" of oversight that uses multiple latent and mani-

fest forms of oversight to keep legislators informed of the activities of postsecondary institutions. While further study is needed, the data suggested that systems with fewer direct forms of oversight compensate with indirect forms.

Scholars outside of the US have also used PAT to analyze higher education governance, but view the relationship from more a canonical perspective. While American studies of PAT tend to focus on the structure of governance systems, Liefner (2003) analyzed forms of resource allocation in higher education systems and their effects on the performance of universities. Liefner recognized that the assumptions concerning goal conflicts and information asymmetries are especially relevant in the higher education context. Because of the specialized knowledge of the faculty, the production of higher education is very difficult to monitor, particularly at the level of research groups and individual scholars, but also at the institutional level. In order to avoid a situation where some agents take advantage of the fact that their efforts are hard to control, Liefner suggested that the principal should use outcome-based contracts in a form of performance-based funding procedures. Based on this analysis, Liefner formulated two hypotheses:

- 1 Agents that have been rather inactive before the introduction of performance-based resource allocation will have to work harder.
- 2 With performance-based resource allocation agents will tend to avoid projects with a high chance of failure. Departments and individuals will concentrate on activities where success can be expected because they will have to meet a formula's criteria or market demand. (pp. 478–479)

Liefner 'tested' these hypotheses with empirical (qualitative) data that consisted of interviews with 53 professors at six universities in the US, Switzerland, the Netherlands, and Great Britain. On the basis of his empirical analysis, Liefner found that the instruments of performance-based budgeting worked largely as predicted in theory. However, although the hypotheses concerning the changes in individual behavior were correct, Liefner found that universities with a large number of highly motivated and qualified faculty were successful regardless of the form of resource allocation. Despite the result that a form of resource allocation could not directly influence the long-term success of universities, Liefner explained that it still could (1) force universities and individuals to pay attention to the needs of governments and taxpayers, (2) help to adjust the organizational structures of universities more quickly to the emerging needs and opportunities, and (3) be used to re-allocate funds to those groups and scholars that have proved to be successful and to reduce the budgets of those who are not performing in an acceptable way.

Seeking to find additional empirical evidence of the PAT applicability to higher education, Gornitzka et al. (2004) attempted to integrate the perspective of PAT into the sphere of contract arrangements between state and higher education institutions. Gornitzka et al. analyzed the strengths and weaknesses of established contract arrangements in Finland, Sweden, and Denmark. The authors made several tentative and incidental observations through the PAT constructs like adverse selection, moral hazard, and information asymmetry. After their analysis, they concluded that a closer integration of the external quality evaluation system with other instruments of regulation is likely to decrease informational asymmetries and thus provide greater

accountability; however, it is not possible to reduce this information asymmetry to zero, because the institutions will always know more about their functioning, efficiency, and quality than the state authorities.

Kivisto (2005), also focusing on the European context, examined some of the key perceptions and insights that PAT could offer for higher education researchers. He applied PAT concepts to the context of government-university relationships and concluded that PAT could provide a useful and applicable framework for analyzing this relationship since it is able to offer explanation for certain government behaviors (e.g. why governments acquire information before making funding decisions, why governments are creating quality assurance mechanisms and performance-based funding procedures instead of input-based funding procedures). Kivisto's other work (2007) continued this discussion by focusing more deeply on the concept of moral hazard opportunism in the context of Finnish higher education system and program implementation. He also examined the potential strengths and weaknesses of PAT more systematically. As a result of his analysis, Kivisto argued that the strengths of PAT lie mostly in its capability of offering theoretical understanding and solutions for the phenomenon of inefficiency and cost growth. Through exploring the weaknesses of PAT, Kivisto identified its limited perspective on human nature and behavior, and the theory's simplicity with regards to its capability of providing accurate descriptions of a complex reality. As a conclusion to his analysis, Kivisto suggested that PAT should be understood as an incomplete, partial, but still justified perspective for examining government-university relationships.

If anything, these recent works show the rapidly growing interest towards PAT and its applicability in studying higher education governance. Reasons for this development are various, but the general emphasis on topics like accountability (economic/political), governance, funding, and performance measurement have guided different researchers to examine PAT in the higher education context. What is interesting is that because of the unique nature of public higher education as both a public bureaucracy and a revenue producing corporation both the economic and political traditions of PAT traditions are represented in these contributions.

Economic PAT Applications to the Study of Higher Education Governance and Policy

The most central issue in economics PAT is contract effectiveness, which focuses on agent shirking and the principal's choice of options available to neutralize it. Logically, different aspects of shirking in universities could be illustrated using approaches that model the economic behavior of universities. Probably two of the best known models are referred to as the 'revenue theory of cost' (Bowen, 1980) and the utility maximizing models of (Garvin, 1980) and James (1986, 1990). In short, Bowen's revenue theory of cost assumes that universities raise as much money as they can, and then spend it all. Utility maximizing models assume that the main goal of the universities is to maximize utility, usually in a form of prestige.

Prestige is important to universities for both non-pecuniary and pecuniary reasons. It is highly associated with good quality and good quality is associated with effective and expensive educational and research services. Further, possessing a good reputation enhances a university's social standing in the larger academic community. Prestige is also important because it contributes to the financial survival of the university. By developing a reputation as a prestigious institution, the market area of a university is likely to be expanded (Garvin, 1980).

Prestige maximization usually includes intra-organizational cross-subsidization. From an economic perspective, cross-subsidization can be understood as activity, where an organization carries out a set of profitable activities that do not yield utility per se to derive revenues it can then spend on utility maximizing activities that do not cover their own costs (James, 1990). Probably the most usual form of cross-subsidization takes place between undergraduate education and research. There, resources of low-prestige undergraduate education are transferred to subsidize high-prestige graduate studies or research (see, e.g. James, 1990; Mora & Vila, 2003). Although research excellence can improve teaching and learning experiences, it often competes directly with undergraduate instruction for the monetary resources and the time and attention of the faculty (Goldman et al., 2001). In fact, undergraduate instruction can be seen as a disutility-making activity preventing faculty from concentrating on prestige generating graduate training and research (Holttä, 1995).

Revenue theory of cost and utility maximizing models indicate the possibility of various types of shirking behavior, which may appear at both the individual and organizational level. Recognizing both levels of shirking is important as governing principals often do not discern the difference between the two, construing most shirking activity as coming from the institution. At the individual level, shirking is likely to come in the form of occasional and uncoordinated activity by individuals. For instance, faculty members could increase their discretionary time largely at the expense of meeting their institutional responsibilities due the increased revenues. This would represent shirking in the full meaning of the word (i.e. faculty divert those working hours not already taken up by teaching, grading, or conducting research to private activities such as accepting speaking engagements or private consulting). Simultaneously, the shirker may benefit from the prestige generated by the collective output of other faculty in his or her department or even elsewhere at the university (James, 1990; Massy & Zemsky, 1994; Ortmann & Squire, 2000).¹⁴ At the institutional level, shirking could mean opportunistic cross-subsidization. The government can provide the same level of resources per undergraduate and graduate student, but the university may actually spend more on prestige-generating graduate students against the will of the government. The latter tend to be taught by expensive expert scholars in small classes, compared with undergraduates who are taught in large classes by less-expensive, relatively inexperienced teaching assistants. Similarly, university administration may base its allocations to departments on

¹⁴The phenomenon of benefiting from the group while not contributing is also referred to as "free riding."

enrollments, but departments may assign low teaching loads, thereby transferring much of their resources to more prestige-generating research activities (James & Neuberger, 1981; James, 1990; Vedder, 2004).

The main problem of shirking from the government's perspective is that it decreases the productivity of universities as assessed by the efficiency and effectiveness of government provided funds. A university behaves opportunistically when it deliberately produces less or less effective outputs with the same inputs or consumes more inputs with same output.¹⁵ Any form of shirking—whether individual or organizational—will have lowering effects on a university's efficiency since it deploys productive resources to other, non-productive purposes. It can also have a negative impact on effectiveness, including the quality of teaching and research. For instance, the shirking activity of the faculty members leading to a constant absence from the scheduled instructional tasks may lead to lower learning outcomes and unnecessary prolonging of students' time to graduation. Effectiveness is also lost when funds intended to be spent on undergraduate education are opportunistically transferred to subsidize research or other more prestige generating activities. Bigger class and group sizes or easier pass-rates in exams may produce "savings" that lower the quality of undergraduate instruction. As a result of this, lower learning outcomes of under-resourced undergraduates also result in ineffectiveness (Kivisto, 2007).

In addition to analyzing shirking behavior of universities, economics PAT offers insights to categorize the alternative government oversight mechanisms (behavior-based contracts vs. outcome-based contracts). Governments perform numerous oversight procedures in their relationships with universities, and many of these procedures have a logical analogy with behavior-based contracts. These include reporting requests, site visits, reviews and evaluations that focus on monitoring the productive activities, with the primary purpose of informing the government about how universities are behaving in economic and operational terms. As in behavior-based contracts, the amount of government funding has a connection with the observed behavior. Different forms of input-based funding arrangements (line-item budgeting/input-based formula funding) applied by the governments represent one type of behavior-based governance procedure (Kivisto, 2007).

The other option for the government to prevent shirking is to offer output/outcome-related incentives to universities. Similarly with outcome-based contracts, the general objective of output-based governance¹⁶ is to reduce goal conflicts by aligning the goals of universities with the ones of the government. It is usually organized through performance-based funding practices which are constructed on some output-based funding formula. Because of the intangible nature of teaching and research outputs, governments have been forced to create surrogate measures and proxies, indicators, to describe and represent the outputs (Cave et al., 1997). Output indicators derived

¹⁵For this general discussion, we are not considering inflationary increases.

¹⁶PAT usually utilizes the term 'outcome' in the traditional meaning of 'output', and therefore, these terms are considered here as synonymous.

from teaching activities can include the number of study credits obtained, the number of exams passed, the number of undergraduate and graduate degrees granted and graduates' employment rates. Output indicators derived from research activities can include the number of research publications, research income, the number of patents and licenses received, the number of doctoral students, and the number of doctoral degrees granted (e.g. Jongbloed & Vossensteyn, 2001). In addition, the government may also use more complex output-based performance indicators, like 'value-added', 'graduation rate', 'graduation time', and various output-connected average cost measures (Cave et al., 1997; Kivisto, 2007).

The central challenge for governments is to make a choice between behavior-based and output-based governance. For this challenge, PAT presents the two inter-related concepts of 'agency variables' (Eisenhardt, 1989) and 'agency costs' (Jensen & Meckling, 1976). Agency variables describe the levels of different internal and external conditions connected to the agency relationship that may have implications for the choice of oversight methods. In other words, agency variables are believed to be able to predict the most efficient governance choice for a given situation.¹⁷ When choosing between different behavior-based and output-based governance procedures, the government can analyze and make predictions about the applicability and cost of each procedure in light of the agency variables. In addition to their predictive capabilities, the use of these variables offers help both for conceptualizing and analyzing many of the strengths and weaknesses that are inherent in using particular behavior- and output-based governance procedures. The other concept, agency costs, can be defined as the total sum of the costs resulting from governing universities plus the costs incurred because of the shirking behavior of the universities. The total governance costs include the direct costs associated with the governing procedures, but also the indirect costs that are incurred because of the dysfunctional effects they cause. The government faces a trade-off between two costly options: either it attempts to decrease informational asymmetries and pay the costs related to behavior-based governance, or, it reduces goal conflict by choosing the output-based form of governing and pays the agency costs related to output-based governance (Kivisto, 2007).¹⁸

Political Science PAT Applications to the Study of Higher Education Governance and Policy

As noted above, there exists a strong if quite varied relationship between public universities and the government of their state and/or nation. This relationship, however, cannot always be construed as one of a standard hierarchical PAT relationship.

¹⁷ Although the exact number of agency variables has varied in different research settings, at least five variables known as 'outcome measurability', 'outcome uncertainty', 'task programmability', 'goal conflict', and 'length of agency relationship', can be identified.

¹⁸ The monetary costs of governance in a given concrete situation are practically impossible to calculate. It is unlikely that government cost calculation systems would be able to count all the costs that are related to the use of a certain type of governance procedures. Nevertheless, these costs can

Universities, as government agents, operate, in part, as public bureaucracies. This type of operation gives need for incorporating aspects of the political PAT to the study of public colleges and universities.

First, like most public bureaucracies, the relationship between the governing principal(s) and universities does not cease to exist should one entity dislike or no longer value the relationship. As previously discussed, the use of performance and behavior-based contracts to guide university behavior are increasingly common. The contracts act as sub-contracts to the more fundamental contract that link the university with the government. While the government can use the subcontracts to regulate specific behaviors, it cannot altogether end its relationship with the university.¹⁹ As Moe (2005) has noted, once created public bureaucracies assume a life of their own and their survival is protected by democratic rules which greatly inhibit governments' ability to eliminate existing parts of the bureaucracy. Thus, while the subcontracts can be renegotiated, the university does not operate under the assumption that its funding will completely disappear nor that its survival could be totally threatened.

Universities were formed and funded by the government to fulfill the need of society to create, preserve, and transmit knowledge. In order to empower the university to be able to fulfill its mission for the public, the government typically appropriates

be indirectly estimated and perceived in other than monetary terms. For instance, the cost of governance procedures could be evaluated indirectly as the amount of planning they require to be established and to operate, the number of new employment positions required, or new hierarchies their application creates and the observable or estimated dysfunctions they inflict on the production behavior of the universities. Due to the invisible and unperceivable nature of shirking behavior, the costs of detected and undetected shirking, 'opportunism costs', are even more difficult to calculate, although analytically they are possible to distinguish (see Vining & Globerman, 1999). Nevertheless, as a theoretical concept, they could offer interesting perspectives in speculating on the meaningfulness and effects of the government governance of universities (Kivisto, 2007).

¹⁹In a standard corporate model, the principal could fire the agent should the agent expend the principal's money in a manner with which the principal does not agree. Further, should the agent not like the terms of the agreement (i.e., expending the money to support undergraduate education), it could choose not enter into a relationship with the principal or seek to cancel its contract. (Or they could both complete the contract and simply choose not to work together in the future.) However, when dealing with public bureaucracies, such actions are not typically possible. Indeed, the government could try to dissolve the university by revoking its charter or deleting the enabling statutes. While such an action is theoretically possible, the practicality is near impossible as it is very difficult to eliminate a public bureaucracy. Structures created through political means often assume a life of their own and thus work to sustain their survivability. In particular, while it is often easy to garner votes to create an entity, it is much more difficult to garner votes to eliminate a public entity, particularly one that provides a public service (Moe, 2005). This inherent sustainability of public bureaucracies allows them a level of power agents in other PAT relationships may not exist. If one realizes that a principal cannot threaten your survival, one may be less likely to fully abide by or pursue the goals of the principal. However, the government does possess options than can threaten the stability or thriving of an institution. For example, governments can choose to reduce or eliminate funding, can influence personnel actions against those supporting insubordinate action, or use their public presence to influence public opinion (possibly resulting in decreases in student quality or private donations).

money to the institution. This is the basis of the implied PAT contract: the government pays for services provided by the university (an agent often created and protected by government rules). However, as noted earlier in the paper, agents (both individual and collective) are self-interested entities and prefer to pursue their own goals in the lieu of those of the principal. Not being able to completely leave or void the contract inhibits the government's ability to enforce the contract and, thus, must create new and vast incentive-based sub-contracts to guide university behavior.

Second, some of the products produced by a university are a public good. Universities engage in ever increasing array of activities, including teaching, research, social criticism, and most recently economic development (Fischer, 2006). These public goods are difficult to measure and it is even more difficult to assess how they are most effectively achieved (Trow, 1996). Above we discussed differences in teaching and research, where a faculty member could be viewed to be shirking teaching responsibilities to focus on graduate education or research. However, one could also argue that the research engaged in by the faculty member makes her a better teacher. Such linkages, realized by some faculty, are not easily measurable or demonstrable. Assuming that research aids in fulfilling the teaching function, it is not always evident at what point does time spent on research begin to negatively impact teaching. This point may vary based on institution, discipline, and faculty member. However, although research excellence can improve teaching, in all disciplines it usually competes directly with undergraduate instruction for the monetary resources and the time and attention of the faculty (Goldman et al., 2001). As such, no performance contract issued by the government can fully cover all aspects of a university's behavior. Thus, while the government may use such sub-contracts to guide university behavior, there is no way to completely eradicate the moral hazard problem as it is impossible to fully measure or observe all of the functions of the university without drastically reorganizing the university structure and diminishing the professional and academic autonomy of the enterprise (e.g. Berdahl, 1990; Gornitzka et al., 2004; Kivisto, 2007).

Third, the government does not operate as a single principal. While there exists some rare occasions when a university can turn to a subcontract that clearly defines the goals of the government, universities usually operate under multiple explicit and implicit contracts (most of which declare a relationship between the university and a specific principal, but the terms of the contract are in constant flux depending on who holds a specific office or title). Universities operate in an environment of multiple, complex principals that created numerous agency problems (Lane, 2005). Shirking can be avoided when the agent's utility from fulfilling the goals of the principal is higher than the utility achieved in pursuing other goals (Frey, 1993). Thus, in order to alleviate shirking, the principal(s) that oversee the university must be identified.

The standard PAT is based on a single-principal relationship, in which the agent assesses and pursues the goals of one principal. The problem with public bureaucracies like universities, however, is that they operate in an environment filled with a range of multiple and collective principals. A multiple principal is when there exists more than one single principal relationship. For example, in the US, Congress and the President operate as multiple principals in that neither is subjugated to the other, but

both can monitor and sanction a bureaucracy without consent of the other (Lyne & Tierney, 2003; see also Calvert et al., 1989; Hammond & Knott, 1996). Assessing shirking in such relationships becomes increasingly difficult, particularly if the multiple principals draft competing contracts with the agent. In such cases, the agent may need to pursue the goals of principal in lieu of the goals of another principal. Is this shirking? More importantly, it raises a set of question not directly addressed by economic models—how does an agent decide to which principal to subjugate? How does the other principal respond? Or, what happens when one principal benefits from the actions of a different principal? Space limitations inhibit our ability to fully explore all of these issues, but we will briefly discuss some of these implications in order to illuminate the implications of politics on the development of this model.

Like economists, political scientists suggest that agents choose which principal to follow based on utility maximization. The problem is how one assesses utility maximization in a political environment. It has already been suggested that survivability is not a concern as democratic rules provide extensive protections. In the corporate realm, the situation would be assessed based on which option would provide the most monetary profit for the agent. However, in politics, strings are usually attached to money, but money is not always the principal motivator. Universities are sometimes principled entities and choose to forego monetary rewards in order to do what they believe is right and proper. Thus, a university may find autonomy more important than increased appropriations. Further, in the political realm actors constantly change. Thus, the university may choose a less profitable contract from an actor with the chance of reelection over that of a lame duck.

Collective principals present particularly interesting agency concerns not witnessed in the other PA relationships because of issues pertaining to collective action (Kiewiet & McCubbins, 1991). While collective principals can be viewed as single agents (e.g., a governing board) their differentiation from a single actor is that multiple individuals must agree on the nature of the contract with the agent. One potential problem with the collective principal is the possibility of underperformance in achieving goals because of the need to appease multiple entities. As such policy proposals may be weakened in order to achieve necessary votes for passage. Or, because of the delegation of power to an agent (e.g., president), the possibility arises for a subset of the collective to influence the agent for their benefit. “In this case, the *de facto* principal is distinct from the *de jure* principal, and thus the delegation must be analyzed in this light” (Lyne & Tierney, 2003, p., 12). Understanding the differences between *de facto* and *de jure* principal is critical for understanding such relationships as that between a governing board and a president. If a board chair rules with nearly absolute authority over the board, the chair becomes the *de facto* principal, even though by law all members of the board comprise the *de jure* principal. In this case, the president is likely to spend most of her time educating and responding to the board president. Time spent on the other members may be viewed as wasted time as they have little impact on the contract. Further, in this example, the board chair may be able to unilaterally influence agent behavior. If the president knows the Chair has the support of the other Board members, requests from the Chair may be perceived as contract changes, even though no formal vote of the *de jure* principal was taken.

The basic tenets of the contractual paradigm, including the existence of information, incentives, and oversight, hold constant in all PAT models. However, the existence of multiple and collective principals and an output that is difficult to measure make it difficult to clearly define the nature of the contract and the parties to that contract. As such, shirking, which continues to exist, becomes difficult to measure and thus more difficult address.

PAT's Application to Higher Education and Directions for Future Research

Like any other theory, PAT has confronted criticism (see, e.g. Perrow, 1986; Donaldson, 1990, 1995; Davis et al., 1997; Ghosal, 2005) and part of this criticism can also be considered relevant in higher education context. PAT has been criticized mostly because of the behavioral assumptions it makes concerning human motivation and behavior. The critics of PAT argue that the theory presents too narrow a model of human motivation and that it makes unnecessary negative and cynical moral evaluations about people. According to critics, focusing on self-interested and opportunistic behavior makes it possible to ignore a wider range of human motives, including altruism, trust, respect and intrinsic motivation of an inherently satisfying task. This criticism has validity also when PAT is utilized for analyzing government-university relationships. If universities are considered only as aggregates of self-interested shirkers, a high level of realism, objectivity and tactfulness will undoubtedly be lost.

Also, the fact that PAT examines agency relationships without questioning the legitimacy or justification of a principal's goals or the task to be accomplished can be considered as a limitation of the theory. In the free market environment, this framework is more understandable because of the free exit option the agents have. Because of the freedom of entry and exit to contracts, those agents that can accept the terms of a principal's contract are assumed to be willing to engage in principal-agent relationships. On the other hand, those agents who do not agree with the terms of a contract are not assumed to be engaged in a principal-agent relationship in the first place. The situation is usually somewhat different in the relationships between the government and public universities, in where universities' exit option is more limited or even denied by legislation. Therefore, one could justly ask the following questions: Should universities accept all the goals of the government without questioning their effects on freedom of speech, academic freedom or other aspects of institutional autonomy? Or, what happens if universities understand better than the government which higher education goals the government should be promoting (Kivisto, 2007)?

While certain objections about the model's assumptions may exist, PAT offers a range of heuristic and theoretical benefits for the study of higher education governance. In particular, the development of the theory in both economics and political science makes it particularly useful and versatile. Universities are driven

by both economic and political motives (as well as philosophical beliefs about the role of the academy). As such both the economic and political derivatives of PAT help explain the behaviors of the various actors involved in the government-university relationship. Yet, as noted throughout this chapter, they neither fully explain the motives of the university; and in some cases the balance of power between the principal and agent leans toward the agent—more so than is typically seen in either economic or political models.

As discussed, economics PAT gives conceptual priority to economic aspects of the principal-agent relationship by investigating and analyzing the agent's shirking behavior and the principal's means to overcome it. In this sense, the economics PAT is "principal's theory" since it takes the perspective of securing the principal's welfare against potential or actual agent opportunism. In the context of higher education, this approach manifests itself in the focus on economic issues like costs, university productivity, and the efficiency and effectiveness of government's control and governance procedures. Moreover, economics PAT understands and examines government-university relationships as bilateral relationships between one principal (government) and one or more agents (universities). Influenced by the assumptions common to rational choice and methodological individualism, it assumes a homogenous incentive structure from the government. Since the concepts and problematizations are derived from markets and private sector settings, special emphasis is put on the explicit nature of explicit governance mechanisms and contracts. Therefore, the funding relationships between government and universities are considered in essence contractual, and they come close to the standard economic form with specific economic agreements distributing the exact responsibilities and rights of contracting parties. For this reason, although teaching, research, and service outputs and outcomes can be considered totally or partially as public goods, they are characterized by the contractual exchange process which is more typical for the transmission of private goods.

From the vantage of political science, universities cannot be viewed merely as contractual agents of the government. While they were originally created by the government to fulfill the needs of citizens, universities possess a level of autonomy that provides some protection from external interference. As such, the university may behave somewhat differently than an agent in a relationship in which a principal can readily end a contract and stop payment should the agent shirk on its responsibilities. Further, political PAT suggests that the government cannot often be viewed as a single entity, rather one that is comprised of multiple principals. When these separate principals act in concert, then the government may be assumed to be acting as a single principal. However, when these principals act in contradictory ways, it is important to recognize the existence of these multiple entities as it has a significant impact on how the university operates. At times, it is assumed that the university may have to select between competing goals—thus it becomes important to know why the university behaved in the way it did.

Finally, in adapting the model to the study of political governance in higher education, we must be vigilant in not just acknowledging what assumptions the different PA models bring to the table; but also how those assumptions impact

perceptions of the operation under study. In fact, understanding the assumptions driving decisions may also help us in understanding certain patterns of institutional behavior. For example, does it make a difference to view the output of the university as a public or private good? To what extent can the output be construed as a private good? However, if we begin to view all of the work of the university in such a light, it may be easy to want to convert all of its work to easily measurable outputs. For example, it is much easier to measure the wages of recent graduates rather than how cultured that student may be. As such, a state may tend to focus on a graduate's employability instead of the quality of his liberal arts education, thus leading government agencies with oversight responsibilities to seek to replace humanities classes with more focused career education.

The vast majority of previous higher education studies applying PAT has utilized the theory primarily as conceptual framework, heuristic tool, or as an organizing concept with a purpose to offer new insights related to government oversight of universities.²⁰ These studies have been able to offer many definitions and operationalizations which can be considered as groundwork for further applications of the theory.²¹ However, the number of empirical studies applying PAT, especially, the studies utilizing quantitative methods, have remained relatively low. For many of the PAT studies containing empirical data, the role of PAT has been treated as being of secondary importance, with priority given to the subject of the study. There may be various reasons for this, but the outcome has probably been influenced by the general lack of familiarity social scientists working in the field of higher education have had with the theory. In addition, suspicions about economic theories and some of their negative behavioral assumptions (e.g. self-interest, opportunism) also have presumably reduced empirical applications of PAT. On the other hand, other studies have given priority to theoretical development of PAT in higher education context without corresponding empirical analysis. Such developments occur, in part, due to the desire to develop more theoretically robust explanations for the operation of higher education governance; and, in part, related to the general problems of testing the PAT's explanatory and predictive potential as a theory.²²

Regardless of the difficulties associated with the competing economic and political assumptions unique to higher education, or the difficulties with testing PAT-based hypothesis, which transcends disciplines and organizational types, PAT does provide

²⁰ A very few scholars (e.g. Gomez-Mejia & Balkin 1992; Wiseman, 1999; Ortmann & Squire, 2000) have used PAT to examine the internal workings of universities, but such analysis is beyond the scope of this discussion. Nevertheless, it seems that also focusing on intra-university agency relationships and their role and influence on government-university relationships still need further empirical clarification and modeling.

²¹ See Kivisto (2007) for more in-depth discussion of the theoretical strengths and weaknesses of the economic theory, particularly in relation to European settings where there tend to be a strong and unitary government organization acting as the principal.

²² For a general discussion of empirical testing of PAT from an economic perspective, see, e.g. Perrow (1986), Eisenhardt (1989), Barney (1990), Donaldson (1990), Petersen (1993) and Ghoshal (2005).

much potential for furthering our understanding of complexities of higher education governance. There exists a fertile field for those interested in incorporating PAT into their work and the following section overviews the practical and theoretical areas ripe for further empirical exploration.

(1) *How can PAT improve understanding of policy and policy making?*

While most of this chapter has explored the theoretical and conceptual issues related to importing PAT into the study of higher education governance, it is important to note the practical benefits of using PAT to study, understand, and improve policy and policy making. Tuition setting, government funding programs (e.g., performance-based funding), governing board restructuring and performance, presidential appointments and decision making, and the implementation of almost any policy (e.g., affirmative action, aid programs, access issues, etc.) could benefit from the use of PAT. For example, by introducing the concept of shirking, PAT offers alternative explanations for lower levels of performance by universities. Shirking behavior may also explain why governments are so willing to invest time, effort and monetary resources in the governing and monitoring of universities. Important questions such as faculty productivity, higher education cost growth, tuition setting, and the quality of undergraduate education can all be analyzed in the light of the shirking concept. PAT is also able to offer insights for policymakers by analyzing the efficacy of alternative oversight mechanisms, such as legislative committee hearings, program reviews, budget reviews, selection of funding mechanisms, performance measurement, or simply allowing students, parents or the press to trigger “fire-alarms”. Indeed, it is important for policy makers to ensure that various oversight mechanisms intended to verify university accountability are both valid, and theoretically and empirically sound, and that they have been developed within a conceptual framework coherent with the ideas and purposes for which they will be used (Cave et al., 1997).

Further, studying the role of information, interests, and incentives could provide a much more rich understanding of the complex dynamics between governors and boards, boards and presidents, legislators and presidents, and so forth. Why is it possible for governor, against the will of the legislature, to influence board behavior? If boards are intended as political buffers, why do politicians often circumvent the board when trying to influence policy? These same factors can help with studying policy decisions made by presidents and how presidents interact with boards. Why could a president be successful by only communicating with the board chair at one institution but loose favor of a board at a different institution with the same behavior? It could simply be because the organization of the board is different and the president failed to appropriately adjust for the differences. Turning to policy implementation, why do institutions embrace some policies while adamantly fight others (or simple ignore their implementation)? Could the explanation be based on philosophical (dis)agreement or the amount of money (incentive) attached to the policy implementation? All of these very practical situations are filled with principal-agent variables that, when acknowledged, could greatly aid in unpacking issues of administration, governance, and policy.

(2) Does shirking exist in postsecondary governance structures? What might such shirking look like? How does it manifest itself?

Even though PAT does not suggest that self-interest and opportunism are the only motivators of human beings or organizations, part of the problem is that the theory partly fails to explain the principal's utility losses by any other factor than agent opportunism. This problem is especially severe in government-university relationships. Given the ulterior nature of university opportunism, it can possibly be detected mainly from the low productivity levels of universities. With the exception of identifying some issues related to output uncertainty, economics PAT has not attempted to provide any analytical apparatus (except the agency variable of outcome uncertainty) by which the principal could distinguish an agent's non-opportunistic performance failures from the opportunistic ones.²³ Political science, however, has identified an issue of slippage—the concept that shirking may be due to information lost in communication, particularly when there are extended principal-agent chains.²⁴

More specifically, as noted previously, shirking can assume both aggressive and passive forms. This is a particularly critical issue in studying the behavior of educational institutions, which must deal with multiple and complex principal-agent relationships in addition to both economic and political motivations. If a government demands change that violates the fundamental tenets of the academy, does the academy shirk if it does not comply with the will of the government? For example, if a legislature demands the university not allow an event with a controversial subject matter (e.g., sex, drugs, offensive art) to occur on campus and the university refuses to comply citing freedom of speech principles, is the university shirking? Further, if the enabling statute suggests that the purpose of the university is “serve the state,” who has the right to determine how the university serves the state?²⁵ Should it be the legislature or should it be the faculty? What if the faculty and the legislature have competing conceptions of appropriate university service? Is it shirking for the university to align itself with the conceptions of the faculty rather than the legislature? If a university refuses to admit an unqualified student that a specific legislator demands be admitted, is the university shirking on its contract with the government? These examples all relate directly to government relations, but similar questions could be raised about relationships with other actors such as students and donors. In an environment with multiple lines of authority, multiple sources of funding, and multiple sets of priorities, the concept of shirking exists but is exceedingly more complicated than that of a simple principal-agent hierarchy.

²³ For recent discussion of organizational performance failures, see, e.g. Meier & Bohte (2003), Mellahi & Wilkinson (2004), Andrews et al. (2006), and Murray & Dollery (2006).

²⁴ See the discussion on page 10.

²⁵ Dunn (2003) provides an excellent discussion of the applicability of the classic Friedrich-Finer debates about the appropriate relationship between elected and non-elected officials to the study of higher education governance.

(3) *How do governments oversee university activities? What are the costs and impacts of different oversight mechanisms? To what extent do oversight mechanisms differ between systems/structures?*

Institutional arrangements differentially impact decision making and decision making processes. As Moe (2005) notes, governments create specific governance structures as a way to enact and institutionalize their agendas and empower specific groups. Therefore, understanding the impact of the arrangement of governance structures can help explain political processes and institutional behavior. A centralized governing board may provide political actors with greater influence over a state's system of higher education by consolidating power at one point of influence; paradoxically, it could increase institutional autonomy as the span of control increases as that one board is charged with overseeing the operations of multiple agents. The existence of multiple agents could make it more difficult for a board to hold institutions accountable. On the other hand, in a decentralized system with a separate board for each institution, the board may be better able to oversee the actions of an institution; but it does make it more difficult for a politician to control or influence a state's higher education system. Other arrangements that PAT could help us understand include the locus of power (constitutional vs. statutory), formation of board membership (elected vs. appointed), identification of board membership (body politic vs. special interest), or construction of reward structures (behavior-based vs. output-based). This topic could include at least the following research questions: Do governments use different types of oversight for constitutionally versus statutorily created institutions? To what extent can the utilization of different governance mechanisms be explained by perceived or real information asymmetries and conflicts of interests between government and universities? What are the impacts of governance mechanisms on the assumed or perceived shirking behavior of universities? What counter-incentives and dysfunctional effects may oversight mechanisms create? How does the selection of board members impact policy outputs (e.g., tuition setting or access)?

(4) *What is the differential impact of single, collective, and multiple principals?*

The existence of multiple and complex principals presents a number of complicating issues for institutions and the recognition of such is fundamental for understanding how a university interacts with different types of powerbrokers and decision makers. This line of research overlaps with the first two points on shirking and the organization of governance structures, but is significant enough to warrant separate mention. Above, we discussed the fact that higher education governance is more complex than the standard single-principal, single-agent relationship at the foundation of most PAT discussions. In reality, universities are responsible to an array of multiple and collective principals. In many cases, principals such as a governor and a legislature have the authority to oversee the activities of a university, but neither need the consent of the other to deal with the agent (Calvert et al., 1989; Hammond & Knott, 1996; Lyne & Tierney, 2003). If the governor and the legislature have two competing plans for higher education, one's interpretation of an institution's activities may differ whether one uses a single-principal or multiple-principal lens. An action

that may be interpreted as shirking in a single-agent model, may be determined to be a strategic political decision when analyzed from a multiple-principal perspective. Both are shirking, but interpretations about institutional intentions may differ. Further research is needed to determine which principal an institution chooses to follow when competing contracts exist. In addition, research needs to explore how competing principals interact with each other, how competition among principals impacts the autonomy of an institution, and the extent to which collective principals operate cohesively or allow individual members to influence the agent. For example, if the members of a coordinating board are caught in a scandal that attracts the ire of the legislature, what is the impact on the institution? Political fighting between the board and the legislature could allow a university to freely engage in activity that might otherwise be questioned or investigated or the event could bring additional attention upon a university causing rather ordinary activities to receive additional scrutiny. In the case of collective principals, many interesting research questions exist that could significantly redefine how boards are studied. As Lane (2005) has noted:

If a board chair rules with nearly absolute authority over the board, the chair becomes the *de facto* principal, even though by law all members of the board comprise the *de jure* principal. In this case, the institution's president is likely to spend most of her time educating and responding to the board president. Time spent on the other members may be viewed as wasted time as they have little impact on the contract between the board and the president. Further, in this example, the board chair may be able to unilaterally influence agent behavior. If the president knows the Chair has the support of the other Board members, requests from the Chair may be perceived as contract changes, even though no formal vote of the *de jure* principal was taken. (p. 22)

Such research areas are not easily pursued as data can be difficult to obtain as such activities usually occur around the edges of sunshine laws, yet a framework such as PAT can aid in understanding the actions of presidents and boards.

(5) How do interests, information, and incentives motivate institutional behavior?

Finally, there is need for further exploration of the different motivations for university behavior and the creation of a model to predict when a university will behave more like an economically-motivated firm or more like a politically-motivated public bureaucracy. The evidence suggests that both types of motivations drive the university and that both economic and political models can partially explain its behavior. Yet, neither model can provide a full exploration and the two models actually contain competing assumptions of organizational and actor behavior. Both models can continue to be used independently, so long as researchers make clear the model which they are employing. However, in order to improve the robustness of the PATs explanatory ability, work needs to be done to identify the conditions under which each model is most appropriate and how the interactions of economic and political motivations impact agent behavior. For instance, more information is needed on the behaviors, motivations and attitudes of the faculty and administrators. The extent in which extrinsic incentives (e.g. salary, positions, promotions, power) and intrinsic incentives (e.g. self-esteem, self-actualization, pleasure from helping others) are motivating the faculty and administrators needs to be assessed both from the economical and political perspectives.

These areas of inquiry demonstrate the need for deepening the dialogue between theoretical assumptions and empirical reality. The final solution of a PAT model for higher education must be context-bound and flexible in a way that some assumptions can be relaxed and some applied from both the economic and political PATs when empirical changing contexts require different approaches and assumptions.²⁶ Rather than viewing this final solution as a simple merger of two incomplete models; it must be built on the most basic assumptions of PAT, but also driven by observations of higher education governance. It cannot be completely driven by the two existing models as they are built on assumptions about organizations that do not fully mirror the nature of tertiary educational institutions. As such, we must move forward in determining commonalities among tertiary educational institutions as well as determining in what ways they compare and differ from corporations and public bureaucracies.

Conclusions

One of the great strengths of PAT has been in its generic nature. Nevertheless, PAT as a framework also evidences various tensions between economics and political science. Therefore, simply applying PAT to the study of higher education without appropriately recognizing the differences between the economic and political versions of PAT may lead to incorrect or misleading conclusions. In adapting PAT from economics to political science, contractual relationships often become implicit rather than explicit, some agents possess various levels of protected autonomy from principal control, principals are not always concerned about agent behavior, and agent performance is not always easily or immediately measurable (such as the case with the profit produced by a business). Both perspectives are useful in attempting to understand and explain the interrelationship of government bureaucracies, the structure and impact of governmental oversight, and the vast information asymmetries that exist within the government. However, failure to realize or acknowledge the specific perspectives guiding a study can result in inaccurate or incomplete explanations of the behavior/actions being examined.

While possessing great benefit, adapting PAT to higher education governance must account for these conflicting assumptions. For instance, university behavior that seem to be shirking from the perspective of economics PAT may be only legitimate political survival strategy from the perspective of political science PAT. Making the merger even more difficult, in most cases it is not simply determining which assumption is correct or the better fit for the model. Indeed, the best fitting assumption may be dictated by the confines of a given situation. As such, we cannot pick one or the other; we must determine the conditions under which a given assumption applies. Acknowledgement of the conditional requirements of an

²⁶Of course, the types of assumptions may also be dictated by the focus of the research question.

assumption is critical for further development of the model as misapplication of an assumption may lead to misdiagnosis of a particular behavior or an ineffective solution to the defined agency problem.

It should not be construed that a theory of higher education governance can not be achieved through the application of PAT. Rather, PAT holds great benefit for scholars of tertiary governance systems. Indeed, contracts, both implicit and explicit, are ubiquitous throughout the university and government relationship. Because the university operates as both a firm and a public bureaucracy, assumptions from both the economic and political PAT are applicable; however, neither is consistently in play and universities may switch between the two depending on the context. As illustrated through this paper, the difficulty is that higher education institutions operate under both economic and political assumptions; thus, understanding their behavior is not as easy as understanding that of a traditional firm or a pure public bureaucracy.

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Toward a Theory of Faculty Professional Choices in Teaching That Foster College Student Success*

John M. Braxton

Introduction

The topic of college student success receives an immense amount of attention in the literature. The files of the Education Resource Information Center identify 9,287 documents that designate college student success as keywords. During the last 10 years, 1,273 publications in *Education Abstracts* indicated college student success as keywords. Moreover, *Dissertation Abstracts* registers 2,086 dissertations completed during the last ten years that list college student success as keywords.

Such a flurry of activity strongly signifies a topic of great interest. However, college student success stands as a topic that cries out for some form of systematic empirical attention. Without the benefit of such scholarly attention, uninformed, ad hoc views on student success and ways to achieve student success will emerge. Focusing systematic empirical attention on college student success requires the development of theoretical perspectives to guide such empirical inquiry. Accordingly, the purpose of this chapter is the formulation of a theory of faculty professional choices in teaching role performance that contribute to student success. This theory centers on faculty teaching role performance because college and university faculty members bear the primary responsibility for most forms of college student success. Critical to the formulation of this theory is a delineation of various sources of influence on faculty teaching role performance as well as those aspects of teaching role performance that contributes to student success. The delineation of these factors provides a foundation for the formulation of a theory of faculty professional choice in teaching that enhance the likelihood of student success.

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Student Course Learning: A Fundamental Contributor to Student Success

Using the literature on the effects of college on students, I (2006) identified eight domains of student success: academic attainment, acquisition of general education, development of academic competence, development of cognitive skills and intellectual dispositions, occupational attainment, preparation for adulthood and citizenship, personal accomplishments, and personal development. Although each of these domains consists of numerous markers of student success (Braxton, 2006), I present herein the most indicative markers of these domains. Academic attainment includes such markers as year to year persistence (Lenning et al., 1974; Astin, 1977), graduation (Willingham, 1985), and academic learning (Lenning et al., 1974; Astin, 1977, 1993). The acquisition of general education consists of such indicators of student success as the acquisition of a general knowledge of arts and sciences (Pace, 1979), learning about significant cultures of the world (Willingham, 1985), and knowledge of community and world problems (Feldman & Newcomb, 1969; Willingham, 1985). Writing and speaking in a clear and effective manner (Pace, 1979; Bowen, 1977, 1996; Willingham, 1985), reading and mathematical skills (Bowen, 1977, 1996), and meeting the requirements of a major (Banta, 1985; Astin, 1977, 1993; Astin & Panos, 1969; Pascarella and Terenzini, 1991) constitute signifiers of success associated with the development of academic competence. The development of cognitive skills and intellectual dispositions includes such markers as critical thinking (Astin, 1977, 1993; Astin & Panos, 1969), problem-solving skills (Astin, 1993), development of intellectual interests (Feldman & Newcomb, 1969), and intellectual tolerance (Bowen, 1977, 1996). The domain of occupational attainment includes such indicators of student success as obtaining employment after graduation in the same field as one's major (Pace, 1969) and experiencing job satisfaction (Astin, 1977; Astin & Panos, 1969). How to present one's self and one's ideas in an acceptable manner (Feldman & Newcomb, 1969), learning how to lead a group (Feldman & Newcomb, 1969), and a knowledge of government (Bowen, 1977, 1996) are markers that define the domain of student success titled preparation for adulthood and citizenship. The domain of personal accomplishments includes such indicators of student success as election to student office (Astin, 1977) and work on the college newspaper (Astin, 1977). Examples of indicators of student success within personal development, the eight domain of student success, include the development of interpersonal self-esteem (Astin, 1977), development of personal identity (Bowen, 1977, 1996), and the development of self-understanding (Bowen, 1977, 1996; Feldman & Newcomb, 1969).

Student course-level learning constitutes a fundamental contributor to the attainment of markers of student success encompassed by six of these eight domains of student success outlined above. These six domains include academic attainment, acquisition of general education, development of academic competence, development of cognitive skills and intellectual dispositions, occupational attainment, and preparation for adulthood and citizenship. Although the achievement of specific

markers of student success within each of these six domains may depend on course content, course-level learning remains paramount. For student success associated with the domains of personal accomplishments and personal development, student course-level learning plays, at best, an indirect role.

Because of its fundamental role in the attainment of college student success associated with six of the eight domains of success, student course-level learning springs forth as the primary focus of faculty teaching role performance.

Faculty Teaching Role Performance

To provide a foundation for the theory advanced in this chapter, this section centers on a literature-based delineation of potential sources of influence on faculty teaching role performance. However, I first concentrate on those aspects of faculty teaching role performance that enhance student course-level learning.

Faculty engage in teaching role performance within a system of external and internal influences (Braxton, 2002). Thus, the categories of plausible sources of influence outlined in this segment of the chapter range from student peer groups to state-level policies and practices. These possible sources of influence emerge from existing literature.

Moreover, complex best depicts the professorial task of undergraduate college teaching role performance. Faculty teaching role performance includes such tasks as course design, teaching preparations, pedagogical practices, course assessment activities, following the tenets of good teaching practices, engagement in the scholarship of teaching, and adhering to norms that proscribe inappropriate teaching behaviors. Professional preferences and choices determine the way faculty perform these tasks. These teaching tasks contribute to student course-level learning. I describe each of these aspects of faculty teaching role performance below.

Pedagogical Practices

Pedagogical practices range from faculty teaching skills to approaches or methods of teaching. Faculty members motivated to teach well acquire and apply such teaching skills and methods of instruction. Pascarella and Terenzini (1991, 2005) delineate teaching skills that positively influence student subject matter learning. These teaching skills include having a good command of the subject matter, clarity in the explanation of course material, structuring the course and using course time well, and using examples to identify key points. Faculty can acquire these teaching skills (Pascarella & Terenzini, 1991, 2005). Research conducted in the 1990s continues to verify the effectiveness of these teaching skills (Pascarella and Terenzini, 2005).

Research shows the effectiveness of such pedagogical methods or approaches as cooperative and collaborative learning (Pascarella & Terenzini, 2005). However,

these approaches require considerable planning and are sometimes difficult to implement in ways true to the specifications of the approach found in the literature.

In contrast, active learning requires much less faculty effort and time to implement. Moreover, research also demonstrates the efficacy of active learning in enhancing student course learning (Pascarella & Terenzini, 2005; Anderson & Adams, 1992; Chickering & Gamson, 1987; Johnson et al., 1991; McKeachie et al., 1986).

Active learning entails any class activity that “involves students in doing things and thinking about the things they are doing” (Bonwell & Eison, 1991, p. 2). Class discussions, debates, role-playing, and pair-group work are good examples of active learning.

Active learning need not be restricted to courses with small student enrollments. Faculty typically teach courses with large enrollments using the lecture method. However, faculty teaching such course can adopt the methods of “enhanced lectures” (Bonwell, 1996; Bonwell & Sutherland, 1996). Enhanced lectures use short mini-lectures followed by active learning activities (Bonwell, 1996).

In addition to enhanced lectures, the type of questions faculty ask students during class provide another way to actively engage students in their learning. Higher order thinking questions actively engage students in the content of their courses. Higher order questions require students to analyze, synthesize or evaluate course content (Fischer & Grant, 1983; Braxton & Nordvall, 1985; Nordvall & Braxton, 1996).

Higher order questioning during class by faculty members also may develop the higher order thinking abilities of students. Although scholars such as Foster (1983), Smith (1977, 1980) and Winne (1979) failed to find such a connection, research by Logan (1976) tends to demonstrate a relationship between the frequency of higher order questions asked by sociology professors and increases in student critical thinking.

Course Assessment Practices

The assignments faculty give to students for the purpose of awarding grades portray what I mean by course assessment practices. Examinations, term papers and other written exercises constitute typical graded course assignments.

Student course learning can result from student engagement in graded course assignments. Some research evidence shows that students’ prior knowledge of the types of questions that will appear on an examination influences the way they study for the exam (Milton, 1982; Milton & Eison, 1983), and that a knowledge of expectations for them affects their learning (Ford, 1981). However, the use of assignments as a learning device requires that faculty carefully design such course assignments.

The level of understanding of course content provides a powerful framework for designing graded assignments. The level of understanding of course content required by students to receive a satisfactory grade on an assignment also influences student learning of course content. The level of understanding of course content also provides a basis for setting the level of academic rigor for a course (Nordvall &

Braxton, 1996). Bloom's (1956) *Taxonomy of Educational Objectives: Cognitive Domain* provides a schema for the design of course examination questions, instructions for term papers and other written exercises that signify the level of understanding of course content displayed by students. Categories of Bloom's Taxonomy range from the lowest to the highest level of understanding: knowledge, comprehension, application, analysis, synthesis and evaluation. The higher the level of understanding of course content that students must demonstrate on examinations, term papers and other written assignments, the greater the level of student course learning achieved.

Moreover, recent research demonstrates that answering higher order questions in coursework enhances the critical thinking abilities of students (Renaud & Murray, 2007). Based on the three studies they conducted, Renaud and Murray conclude "the findings of this research clearly indicate that students are more likely to improve their critical thinking skills when they have answered higher-order questions in their coursework (2007, p. 345)."

Good Teaching Practices

Chickering and Gamson (1987) describe seven principles of good practice for undergraduate education. A robust body of research shows that faculty adherence to these seven principles positively impacts student learning (Sorcinelli, 1991). Thus, faculty members who make a professional choice to apply these seven principles in their day-to-day teaching role performance enhance student learning of course content. Encouragement of student-faculty contact, encouragement of cooperation among students, encouragement of active learning, provision of prompt feedback, time on task, the communication of high expectations and respect for diverse talents and ways of knowing constitute the seven principles.

The encouragement of faculty-student contact entails frequent interaction between students and faculty both in and out of class (Chickering & Gamson, 1987). Frequent faculty-student contact enhances student motivation and involvement.

The second principle of good practice encourages cooperation among students. The sharing of ideas among students and reacting to the ideas of other students yields a positive effect on student learning (Chickering & Gamson, 1987).

The third principle centers on the encouragement of active learning. I previously discussed the importance of active learning as a pedagogical practice.

Appropriate feedback on student performance on course assignments enables students to appraise their understanding of course content. Opportunities for such feedback should be frequent (Chickering & Gamson, 1987). The provision of prompt feedback forms the fourth principle of good practice.

An emphasis of time on task constitutes the fifth principle of good teaching practice. Chickering and Gamson (1987) define time on task as the amount of time devoted to learning course content.

The sixth principle involves the communication of high expectations. This particular principle entails both setting high standards for students, but also expecting them to meet them (Chickering & Gamson, 1987).

The seventh and last principle recognizes that students have different skills and abilities and ways of learning. The enactment of this principle requires faculty to give students opportunities to show their skills and styles of learning to their best advantage (Chickering & Gamson, 1987). Chickering and Gamson label this principle respect for diverse talents and ways of knowing.

The Scholarship of Teaching

The development and improvement of pedagogical practices depicts the goal of the scholarship of teaching (Braxton et al., 2002b). Classroom research and the development of pedagogical content knowledge provide a foundation for the development and improvement of pedagogical practices (Paulsen, 2001; Braxton et al., 2002b; Paulsen & Feldman, 2006). Classroom research consists of systemic inquiries conducted to increase insight and understanding of the relationship between teaching and learning (Cross, 1990). Moreover, faculty engaged in classroom research use their own classrooms for such research. Faculty members engaged in classroom research focus on topics that emerge from their own teaching (Cross & Angelo, 1988). Ideally, faculty conducting classroom research use the results of their research to improve their own teaching and thereby student learning (Cross & Angelo, 1988). Classroom research becomes scholarship when the findings are put in such a form that they can be assessed by peers, are publicly observable and in a form amenable to distribution and exchange with peers (Shulman & Hutchings, 1998).

Pedagogical content knowledge acknowledges that collegiate level teaching is both domain and subject specific (Shulman, 2002). Shulman (1987) clarifies the meaning of pedagogical content knowledge by stating that “pedagogical content knowledge is of special interest because it identifies the distinctive bodies of knowledge for teaching. It represents the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction” (p. 8). Thus, one focus of pedagogical content knowledge is the identification of ways to make subject matter understandable to students (Shulman, 1986).

Faculty members committed to improving their own teaching may engage in the development and refinement of pedagogical content knowledge for the courses they teach. Other faculty may focus on the development and improvement of pedagogical content knowledge to improve teaching in their particular academic discipline. The development and refinement of pedagogical content knowledge becomes scholarship when the results of such efforts are put into a form amenable to review by peers, is public, and that peers can share and exchange this work (Shulman & Hutchings, 1998).

Adherence to Teaching Norms

College and university faculty members enjoy considerable autonomy in the professional choice they make in their undergraduate teaching role performance (Braxton & Bayer, 1999; Braxton et al., 2002a). Without norms, faculty are free to make unconstrained and idiosyncratic choices in their teaching (Braxton et al., 2002a). Norms function to assure that college and university faculty members make choices in their teaching that protect the welfare of students as clients of teaching role performance (Braxton & Bayer, 1999). Norms perform this function by delineating prescribed and proscribed patterns of behavior (Merton, 1968, 1973).

A normative structure for undergraduate college teaching exists. This empirically derived normative structure consists of six inviolable patterns of proscriptions for teaching role performance pertinent to students (Braxton & Bayer, 1999). Inviolable norms refer to those patterns of behaviors that faculty believe should be severely sanctioned (Braxton & Bayer, 1999). This normative structure consists of the following six inviolable normative orientations that pertain to students as clients of teaching role performance: *Condescending Negativism*, *Inattentive Planning*, *Moral Turpitude*, *Particularistic Grading*, *Personal Disregard*, and *Uncommunicated Course Details*.

The norm of *Condescending Negativism* rebukes the treatment of both students and colleagues in a condescending and demeaning way. The norm of *Inattentive Planning* censures a lack of planning for a course (e.g. required texts not routinely ordered in time for the first class session, and a course outline or syllabus is not prepared for the course). *Moral Turpitude* prohibits depraved, unprincipled acts by faculty. The norm of *Particularistic Grading* condemns uneven or preferential treatment of students in the awarding of grades. Disrespect for the needs and sensitivities of students (e.g., profanity in class, poor hygiene by faculty) defines the norm of *Personal Disregard*. *Uncommunicated Course Detail*, the sixth normative pattern, castigates the failure of faculty members to inform students of important particulars about a course during the first day of class (e.g. changing class location to another building, changing class meeting time without consulting students, students not informed of the instructor's policy on missed or make-up examinations).

Research tends to demonstrate that faculty violations of these six inviolable normative patterns negatively affect the academic and intellectual development of students (Braxton et al., 2004). Thus, faculty who heed these six inviolable normative orientations positively influence the academic and intellectual development of students. Academic and intellectual development provides an index of student course learning.

Sources of Influence on Teaching Role Performance

As previously stated, faculty teaching role performance transpires within a system of external and internal sources of influence (Braxton, 2002). In this section, I describe literature-based potential sources of influence. These sources of influence include student peer groups, organizational influences, and state level policies and practices.

Student Peer Groups

Student peer groups exert considerable influence on student behavior (Pascarella, 1985; Weidman, 1989; Kuh, 1995). Any group of students with which individual students seek membership, acceptance and approval constitutes a peer group (Astin, 1993; Newcomb, 1966). Accordingly, student peer groups develop in such settings as residence halls, organized clubs and activities, intercollegiate and intramural athletics, and the classroom.

Some scholars assert that peer groups affect the level of student engagement in their courses by setting expectations for the study habits of group members (Baird, 1988; Kuh, 1995; Newcomb, 1966). Student peer groups wield their influence on students through the beliefs, language, norms, practices and values that develop within a given peer group (Kuh & Whitt, 1998).

Student peer groups also affect the teaching role performance of college and university faculty members. More specifically, the values, norms and behaviors of student peer groups impact the professional choice faculty members make in their teaching. Student classroom incivilities and student normative support for good practices in undergraduate education constitute ways student peer groups influence faculty teaching role performance.

Classroom Incivilities

Student behavior in the form of classroom incivilities negatively influences the teaching role performance of college and university faculty members. Two broad categories of incivilities spring from the work of Boice (1996): disrespectful disruptions and insolent inattention (Caboni et al., 2004; Hirschy & Braxton, 2004). Disrespectful disruptions take the form of active behaviors by a student(s) that negatively influence the learning of other students in the class. Such behaviors include talking while the instructor or other members of the class are talking, interrupting others while they are talking, reading the newspaper during class, receiving cellular telephone calls and departing the class before being excused by the professor. Students who fail to pay attention in class define insolent inattention.

Research tends to show that both disrespectful disruptions and insolent inattention negatively affect student perceptions of their academic and intellectual development (Hirschy & Braxton, 2004). These two forms of classroom incivilities also negatively influence faculty teaching role performance. Boice contends that inappropriate faculty classroom behaviors give rise to student classroom incivilities. Likewise, student classroom incivilities might prompt faculty to violate norms for undergraduate college teaching (Braxton & Bayer, 1999). Because student incivilities harm student learning and irritate faculty, faculty members may also experience less motivation to teach well.

Research tends to demonstrate that students espouse a normative pattern that proscribes insolent inattention, but not disrespectful disruptions (Caboni et al.,

2004). Given the existence of a norm that rebukes insolent inattention by students, faculty members will encounter insolent inattention less frequently than disrespectful disruptions.

Support for Good Teaching Practices

As previously indicated, Chickering and Gamson (1987) describe seven principles of good practice for undergraduate education. Although faculty play a direct role in the implementation of these practices, their implementation may also depend on student support (Caboni et al., 2002). Four of the seven good teaching practices require student normative support: time on task, the communication of high expectations, the encouragement of faculty-student contact, and the encouragement of cooperation among students (Caboni et al., 2002). More specifically, Caboni et al. (2002) assert that student normative support fosters the successful enactment of one or more these four good teaching practices by faculty members. In contrast, a lack of student normative support for one or more of these good teaching practices reduces the likelihood of their successful execution by faculty.

Caboni et al. (2002) found student normative support for three of these four good teaching practices. The three good teaching practices benefiting from student normative support are the encouragement of faculty-student contact, cooperation among students, and communication of high expectations. Time on task failed to receive student normative support. Support and the lack of support for good teaching practices influence the choice faculty members make regarding the implementation of the good teaching practices delineated by Chickering and Gamson (1987).

Organizational Influences

Some scholars (Birnbaum, 1988; Ewell, 1985) hold that college and university administrators pay little attention to student learning. In contrast, Paulsen and Feldman (1995) point out that college teaching does not transpire in a vacuum. They add that college and university faculty members are members of an organization and that the culture of that organization can positively or negatively influence their teaching (Paulsen & Feldman, 1995). In addition to the culture of the organization, departmental administrative behavior indirectly influences student learning (Del Favero, 2002).

Teaching Cultures

Teaching cultures place a high value on college teaching. Such cultures can occur at the level of the college or university or at the level of the academic department

(Paulsen & Feldman, 1995). Eight characteristics derived from the research literature demarcate a teaching culture (Paulsen & Feldman, 1995).

The first defining characteristic entails commitment and support from high-level administrators of the institution (Paulsen & Feldman, 1995). Senior administrators communicate the high value the institution places on teaching. They also accord high visibility to efforts focused on the improvement of teaching. Moreover, faculty must perceive that the high value being placed on teaching through words is not mere lip service. Other actions by senior administrators exhibit the high value the institution places on teaching.

The second defining characteristic of a teaching culture involves the pervasive involvement of faculty in every aspect of the planning and implementation of efforts to improve teaching. Such extensive faculty involvement contributes to the formation of shared values about teaching between faculty and administrators. Through extensive involvement and the sharing of values, faculty come to perceive that they possess ownership in the process.

The adoption of a broader definition of scholarship by the institution constitutes the third defining characteristic of a teaching culture. This particular characteristic finds manifestation in an institutional academic reward structure that places an appropriate balance between teaching and research. Such reward structures also give weight to faculty engagement in the scholarship of teaching, especially as it relates to the faculty member's academic discipline (Paulsen & Feldman, 1995).

The practice of a teaching demonstration or a pedagogical colloquium as part of the faculty selection process denotes the fourth salient characteristic of teaching cultures. Such a practice demonstrates the importance accorded teaching. A demonstration of a faculty candidate's teaching ability results from this practice. Shulman (1995) suggests three models for a pedagogical colloquium. The first model termed the "course narrative or course argument" approach involves the use of a syllabus by the faculty candidate to explain how they would teach a course, the topics to be covered, and the nature of the experience for both students and faculty. A faculty candidate displays their philosophy about teaching and learning through this model. The second approach entails a Colloquium centered around an essential idea or topic. The candidate selects a difficult disciplinary concept for students to learn. The candidate describes the approaches he/she would use to help students learn the concept. The third approach Shulman (1995) calls a "dilemma-centered colloquium." In this approach, a candidate is asked to "think out loud" about a problem in teaching the discipline (e.g. the balance between breadth and depth in an introductory course).

The fifth demarcating characteristic of a teaching culture involves frequent interaction, collaboration and community among faculty about issues pertaining to teaching. Paulsen and Feldman (1995) indicate that intrinsic rewards from teaching emerge from frequent opportunities for faculty to talk with their peers about teaching. Collaboration with other faculty members in teaching is another important aspect of this characteristic of teaching cultures. Team-teaching is one method of collaboration (LaCelle-Peterson & Finkelstein, 1993). The formation of a community of college teachers constitutes another attribute of this particular

defining characteristic. A community of college teachers involves the sharing of ideas about teaching, intellectual stimulation around teaching and a reduction in isolation many faculty interested in teaching frequently experience (Aitken & Sorcinelli, 1994).

The existence of a faculty development program or campus teaching center marks the sixth defining characteristic of teaching cultures (Paulsen & Feldman, 1995). The presence of either of these efforts focused on the improvement of teaching signifies a high value placed on teaching.

Supportive and effective department chairpersons constitute the seventh delimiting characteristic of a teaching culture (Paulsen & Feldman, 1995). Such chairpersons communicate the high value they place on teaching. The actions of such department chairs include providing their departmental colleagues with information on how teaching is valued, how one can use their time most effectively and the basis for allocating rewards (Rice & Austin, 1990).

The eighth characteristic of a teaching culture require that a relationship between a rigorous evaluation of teaching and decisions about tenure and promotion exists (Paulsen & Feldman, 1995). To elaborate, departments that value quality teaching also value a rigorous process of peer and student evaluation of teaching. The outcomes of such evaluations carry some weight in tenure and promotion decisions.

Administrative Behaviors in Academic Departments

The behavior of college and university administrators indirectly influence student learning. Del Favero (2002) postulates that administrative behavior indirectly influences student learning in a positive way if such behavior supports the work of faculty members and fosters a learning climate.

The academic department provides the optimal setting for the influence of administrative behavior on student learning (Del Favero, 2002). The work of academic department administrators consists of resource management, program support and student services. In performing the tasks of these domains of work, departmental administrators guide the activities of the department toward the enhancement of student learning. Such pertinent activities include student evaluation of teaching, student advisement, cooperative instructional activities, and faculty assessment (Del Favero, 2002).

Administrators play an important role in the process of student evaluation of teaching by providing the results of course assessments in a prompt manner to faculty (Del Favero, 2002). Departmental administrators should also conduct periodic reviews of the procedures followed in conducting student evaluations of teaching. Such reviews should determine if these procedures accomplish the goals of student evaluations of teaching (Del Favero, 2002). Departmental administrators should also communicate information regarding the instructional improvement services of the institution's faculty development and teaching centers (Del Favero, 2002). By engaging in these activities related to student evaluation

of teaching, departmental administrators assist faculty in improving and refining their teaching role performance.

Although faculty members perform those primary advising roles that relate to student learning, departmental administrators facilitate the advising role of faculty by providing students and faculty with routine information related to degree requirements and particular courses. The responsibility for the development and maintenance of such systems rests with departmental administrators (Del Favero, 2002).

Departmental administrators also indirectly influence student learning by assisting faculty members in their development of new learning experiences for students (Del Favero, 2002). Time commitments of faculty members may prohibit them from developing new instructional experiences. Departmental administrators can provide needed support to faculty to lessen the burden of time constraints (Del Favero, 2002). Such support includes administrative support or a graduate teaching assistant. Department chairs must demonstrate a commitment to assisting faculty members interested in trying new pedagogical techniques (Del Favero, 2002).

The assessment of faculty work should center attention on the development of guidelines and procedures for faculty to document the linkages between their teaching, research and service role performance and student learning (Del Favero, 2002). Departmental administrators play a vital role in such an effort by working with their chief academic affairs officer and other academic affairs officers to formulate mechanisms that allow faculty members to document their work that affects student learning (Del Favero, 2002).

State-Level Policies and Practices

Hearn and Holdsworth (2002) carefully point out that indirect best describes the influence of state-level policies and practices on student learning as institutional leaders and faculty play the key roles. Moreover, the college or university as an organization serves a mediating function between the enactment of such state-level policies and practices and individual college and university faculty members. Hearn and Holdsworth (2002) delineate various plausible ways in which state policies and practices indirectly influence faculty teaching role performance, which in turn, affect college student learning. These policies and practices apply predominately to state-supported colleges and universities.

State funding practices constitute one category of possible influences on faculty teaching role performance. Hearn and Holdsworth (2002) describe performance funding and targeted budget allocations as such state-funding practices.

Performance funding entails the allocation of funds to colleges and universities that meet specific educational goals. The goals used in performance funding include those identified as markers of student success associated with student course learning delineated in the previous section of this chapter. These performance goals include performance on professional examinations and job placement (Hearn & Holdsworth, 2002).

Targeted budget allocations encompass a range of financial allocations ranging from capital spending for physical facilities to student financial aid. However, targeted allocations for technology and faculty development seem the most closely tied to faculty teaching role performance (Hearn & Holdsworth, 2002).

Other state policies and practice include institutional mission differentiation and accountability measures (Hearn & Holdsworth, 2002). Mission differentiation entails state-level assignment of varying missions to different colleges and universities. Such mission differentiation can possibly affect faculty teaching role performance when state higher education policies assign some colleges and universities the role of emphasizing undergraduate education as its primary mission (Jones & Ewell, 1993). In contrast, vague and unspecific missions can negatively affect faculty teaching role performance (Jones & Ewell, 1993).

Program review and assessment or performance indicators constitute types of state-level accountability practices for holding higher education institutions accountable for performance (Hearn & Holdsworth, 2002; Alexander, 2001; Ruppert, 1994). Performance indicators often include student learning outcomes (Hearn & Holdsworth, 2002). The application of such performance indicators wields an influence on faculty teaching role performance. Hearn and Holdsworth (2002) assert that some state-level academic program reviews seek to improve instructional quality and strengthen student learning. Such program reviews also exert a positive influence on faculty teaching role performance.

These various sources of influence provide the foundation for the development of a theory of faculty teaching role performance. The next section of this chapter describes this theory

Theoretical Formulations

Role theory provides the conceptual foundation for a theory of faculty choices in undergraduate college teaching role performance. Role theory focuses on the enactment of roles in various social settings (Sarbin & Allen, 1968). Role expectations affect role enactment or role performance (Sarbin & Allen, 1968). Beliefs, duties, and obligations for the enactment of a particular social role define the meaning of role expectations (Sarbin & Allen, 1968). Individuals tend to comply with role expectations. Thus, the greater the clarity of such role expectations, the greater the degree to which an individual performs the focal role in a convincing and appropriate way (Sarbin & Allen, 1968).

Role Theory Applied to Faculty Teaching Role Performance

I extend role theory and its concepts of role enactment, role expectations and clarity of role expectations to the case of faculty undergraduate teaching role performance.

I also use key elements of Expectancy Motivation Theory (Mowday & Nam, 1997) as a helper theory. The extension of role theory to faculty teaching role performance and the use of expectancy motivation theory as a helper theoretical perspective gives rise to a theory of faculty choices in teaching role performance that contribute to undergraduate student learning. The formulations of this theory emanate from the extensions of role theory and expectancy theory as well as the various sources of influence on faculty teaching role performance described previously in this chapter. Thus, this theory emerges from the process of inductive theory construction. Inductive theory construction uses the findings of empirical research to derive new concepts, patterns of understanding, and generalizations (Wallace, 1971).

Formulations of the Theory

State higher education policies and practices convey expectations that shape the decisions and actions of the central administrations of state-supported colleges and universities. The President and Chief Academic Affairs Officer and other members of the central administration embrace an abiding concern for faculty teaching role performance and undergraduate college student learning when the policies and practices of their state ascribe a high value to the improvement of undergraduate college student learning and faculty teaching role performance. Such state policies and practices convey clear expectations for the improvement of undergraduate education and faculty undergraduate teaching to the central administrators of state-supported colleges and universities.

State policies and practices such as performance budgeting, targeted budget allocations, institutional mission differentiation, outcomes assessment and academic program review provide the vehicle for the expression of such a pattern of expectations. When performance funding practices reward institutions that meet goals for improvements in undergraduate college student learning (Hearn & Holdsworth, 2002), such actions transmit strong expectations for improved college student learning. States that target budget allocations for faculty development (Hearn & Holdsworth, 2002) also clearly communicate expectations for the improvement of faculty teaching role performance. The specification of the missions of the various state-supported colleges and universities also play a role in the communication of expectations for faculty teaching and student learning when specific institutions are assigned the primary role of undergraduate education (Hearn & Holdsworth, 2002; Jones & Ewell, 1993). State outcomes assessment practices and program reviews that stress the importance of undergraduate college student learning also communicate the high expectations a state holds for undergraduate teaching and learning. The more of these state policies and practices that stress the importance of faculty teaching role performance and enhanced college student learning, the clearer the expectations transmitted.

In those states that stress the importance of undergraduate college teaching and learning through their policies and practices, the leaders of individual state-supported

colleges and universities will adopt a similar pattern of expectations. The greatest likelihood for leaders to embrace expectations for faculty teaching role performance directed toward the improvement of student learning occurs when a state employs all four of the above state policies and practices. In contrast, in those states that do not stress the importance of undergraduate college teaching and learning through their policies and practices, the leaders of individual state-supported colleges and universities follow their own pattern of expectations for faculty teaching role performance.

Regardless of the characteristics of state policies and practices, the expectations leaders of individual colleges and universities hold for undergraduate college teaching and learning wield a direct influence on faculty teaching role performance. The central administration plays an indirect role by contributing to the forging of an institutional “culture of teaching” (Paulsen & Feldman, 1995). Cultures shape the behaviors of their members through norms, values, practices, beliefs and assumptions that members of the culture endorse (Kuh & Whitt, 1988).

The central administration fosters the development of an institutional teaching culture by communicating their commitment and support for excellence in faculty teaching role performance (Paulsen & Feldman, 1995) and by involving faculty in all aspects of the planning and execution of policies and practices designed to improve undergraduate teaching and learning (Paulsen & Feldman, 1995). In addition, institutional leaders contribute to the development of an institutional teaching culture by modifying existing academic reward structures to give more weight to teaching and by recognizing the scholarship of teaching as a legitimate form of scholarship (Paulsen & Feldman, 1995). Support for faculty development programs and centers for teaching constitute another way in which institutional leaders facilitate the development of an institutional culture of teaching (Paulsen & Feldman, 1995). In addition to these ways, the implementation of the practice of requiring that all candidates for faculty positions must give a demonstration of their teaching (Paulsen & Feldman, 1995).

The more of these approaches to the development of an institutional culture of teaching that the leaders of the central administration use, the clearer the expectations for faculty to make professional choices in their teaching role performance that contribute to the learning of their students. Although all of these ways of involvement in the forging of an institutional teaching culture clearly communicate institutional expectations for teaching role performance that enhances student learning, institutional academic reward structures that accord some weight to the scholarship of teaching clearly communicate a specific expectation for faculty engagement in the scholarship as a particular aspect of teaching role performance.

The involvement of the leaders of the central administration in the formation of an institutional culture of teaching also affects the administrative behavior of the chairpersons of academic departments. Although some department chairpersons convey clear expectations for faculty professional choices in their teaching role performance that contribute to student learning, other department chairpersons come to embrace such expectations for their departmental faculty colleagues because of the messages they receive from those actions of the leaders of the central administration that contribute to the development of an institutional culture of teaching.

The chairpersons of academic departments impart expectations for the teaching role performance of individual faculty members in several ways. Like leaders of the central administration, department chairpersons also encourage the development of an institutional culture of teaching. The frequent communication of the high value they place on undergraduate college teaching constitutes the primary way in which department chairpersons foster the forging of an institutional and departmental culture of teaching (Paulsen & Feldman, 1995). Specifically, chairpersons clearly express their expectations for teaching role performance by communicating to departmental faculty members the weight good teaching receives in the allocation of faculty rewards (Rice & Austin, 1990). Chairpersons also disclose their expectations for teaching role performance by creating opportunities for faculty members in their departments to frequently meet to discuss problems and approaches to their undergraduate teaching (Paulsen & Feldman, 1995).

Chairpersons also transmit expectations for professional choices in faculty teaching role performance through the performance of their administrative duties. Chairpersons promote the improvement of teaching role performance by facilitating the prompt return of the results of student course assessments (Del Favero, 2002). Department chairs also encourage the improvement of teaching by informing departmental faculty members of the services of faculty development or teaching centers (Del Favero, 2002). Department chairpersons can also help faculty members try new pedagogical practices (Del Favero, 2002). Chairs assist such faculty members by providing release time to learn and develop new pedagogical practices. The greater the performance of those administrative duties that value undergraduate college teaching by chairpersons of academic departments, the clearer are the expectations for professional choices in teaching role performance that enhance student learning.

Faculty Motivation to Teach Well

Because faculty members possess considerable autonomy in their teaching (Braxton & Bayer, 1999), they are free to make professional choices among those aspects of teaching that contribute to student learning. Clear expectations for faculty teaching role performance communicated by the formation of institutional teaching cultures, the actions of institutional leaders, and the actions of department chairpersons produce an inclination in faculty to follow such expectations. Clear expectations for teaching role enactment constitute a necessary, but not a sufficient condition for faculty engagement in those aspects of teaching that require some effort. The choice of those aspects of teaching role performance that require some effort by faculty to enact requires some degree of faculty motivation to teach well. Bess (1997) asserts that “teaching well and liking it is very hard to come by (p. xi).” Teaching well requires focus, commitment and an expenditure of considerable energy (Bess, 1997).

The various aspects of teaching role performance—choice of pedagogical practices, the choice of course assessment practices, the application of good

practice in undergraduate education, engagement in the scholarship of teaching and adherence to norms of undergraduate college teaching—vary on a continuum of low effort to high effort required by faculty members to perform them. At one extreme, faculty adherence to the norms of undergraduate college teaching requires a minimal degree of effort, whereas engagement in the scholarship of teaching requires a considerable degree of effort. Enactment of active learning and the seven good principles of undergraduate education described by Chickering and Gamson (1987) require more effort than norm adherence, but less effort than the scholarship of teaching. Although requiring less effort than the scholarship of teaching, cooperative and collaborative learning, asking students higher order thinking questions in class and on examinations requires greater effort than active learning or the use of good practices in undergraduate education.

Lecturing predominates as more than three fourths (76.2) of college and university faculty members use it as their primary method of instruction (Finkelstein et al., 1998). Thus, the choice to engage in those aspects of teaching that go beyond lecturing such as the scholarship of teaching, asking higher order questions in class and on examinations, the use of active learning, and the use of cooperative and collaborative learning requires some learning by faculty members to implement them successfully. In contrast, the need to safeguard the welfare of students as clients of teaching role performance compel faculty to adhere to norms of undergraduate college teaching (Braxton et al., 2004; Braxton & Bayer, 1999). This normative structure has been empirically derived from the perceptions of faculty (Braxton & Bayer, 1999). As a consequence, adherence to such norms requires little effort from faculty and produces a sense of self-worth and self-esteem in faculty members. Likewise, the use of the seven principles of good practice delineated by Chickering and Gamson (1987) requires little effort from faculty. The use of these practices also engenders a sense of personal accomplishment in faculty by contributing to the learning of students in one's courses.

If faculty members perceive that they will receive valued extrinsic rewards for their performance of those aspects of teaching role performance that require effort, they will possess the motivation needed to expend effort necessary to accomplish these teaching tasks. Such academic rewards as tenure, promotion, continued appointment and increases in pay constitute such extrinsic rewards or outcomes of their efforts valued by faculty members. Thus, faculty members who perceive that they will likely receive a substantial increase in pay, be reappointed, receive tenure or be promoted in rank are more likely to engage in the scholarship of teaching, ask students higher order thinking questions in class, write examination questions that require higher order thinking, and use such pedagogical practices as active learning, collaborative learning and cooperative learning than are faculty who perceive that they are unlikely to receive such valued extrinsic outcomes from such teaching efforts.

This hypothesis springs from the formulations of expectancy theory. Expectancy theory focuses on accounting for how individuals make decisions between different or alternative activities. Expectancies take the form of beliefs or subjective probabilities that a specified outcome will likely follow from behavior (Mowday & Nam,

1997). The crux of expectancy theory reads like this: the greatest level of motivation to teach well occurs when individual faculty members perceive that their efforts will result in a higher level of teaching role performance and higher levels of teaching role performance will result in a highly valued intrinsic or extrinsic outcome. The following paragraphs offer an explication.

Three assumptions underlie expectancy theory. These assumptions take the following forms: individuals hold expectancies or beliefs about the outcomes of their behavior, individuals have preferences about the different outcomes of their behavior, as some outcomes are preferred over others, and individuals behave self-interestedly in choosing among different tasks and levels of effort to expend in performing the chosen task (Mowday & Nam, 1997).

Level of performance or task accomplishment constitutes the most fundamental outcome of expectancy theory (Lawler, 1973). In terms of college and university faculty, the degree of effort expended by a faculty member to teach well flows from their perception that they are likely to teach well if they expend the needed effort (Mowday & Nam, 1997).

Moreover, individual faculty members are also motivated to teach well if they perceive that such performance will lead to outcomes that are either extrinsic or intrinsic. Extrinsic outcomes are controlled by others and take the form of pay raises, awards, and promotions. Intrinsic rewards emanate from the individual. Examples of intrinsic rewards are self-esteem, personal growth and a sense of accomplishment (Mowday & Nam, 1997). By extension, faculty members who observe student course learning also receive a sense of accomplishment or receive an intrinsic reward. Valence of outcomes or the value the individual faculty member places on the outcome constitutes the third element of expectancy theory (Mowday & Nam, 1997).

However, some faculty members will be sufficiently motivated to choose those aspects of teaching role performance that require considerable effort and learning without the expectation of receiving such extrinsic rewards as tenure, promotion, or increases in pay. Moreover, the meting out of such extrinsic rewards is not likely to eradicate such intrinsic motivation. Deci, Kasser and Ryan contend that when individuals already highly value the expected behaviors, their engagement in these behaviors occurs “in an unconflicted, nonpressured, and truly choiceful way” (1997, p. 62).

Recapitulation

Expectations for faculty teaching role performance that enhance undergraduate student course learning emanate from the external environment and from the college or university as an organization. State policies and practices such as performance budgeting, targeted budget allocations, institutional mission differentiation, assessment of outcomes and academic program reviews convey clear expectations for student course learning to the leaders of colleges and universities.

Leaders of state colleges and universities heed these clear expectations from state policies and activities. In turn, institutional leaders convey such expectations through their actions directed toward the development of an institutional culture of teaching. Institutional leaders also influence the administrative behavior of the chairpersons of academic departments. Chairpersons of academic departments convey clear expectations for faculty teaching role performance that contributes to student course learning through the performance of administrative duties related to teaching and by actions directed toward the development of a teaching culture. The clear expectations for faculty teaching role performance directed toward enhanced student course learning that institutional leaders and department chairpersons convey to faculty members predispose individual faculty members to conform to such expectations for their teaching. However, faculty must possess some degree of motivation to teach well to engage in those aspects of teaching that require some effort. If faculty perceive that they are likely to receive such valued outcomes as an increase in pay, tenure or promotion, then they are likely to engage in such aspects of teaching role performance that require effort to successfully implement. The following seven testable hypotheses emerge:

1. In those states that stress the importance of undergraduate college teaching and learning through their policies and practices, the leaders of the central administration of individual colleges and universities are more likely to adopt a similar pattern of expectations than in states that do not emphasize the importance of college teaching and student learning in their policies and practices.
2. The greater the number of state policies and practices directed toward the improvement of undergraduate student course learning, the greater the likelihood that the leaders of the central administration of individual colleges and universities in such states will embrace clear expectations for faculty teaching role performance directed toward the improvement of student learning.
3. In those colleges and universities where the leaders of the central administration engage in approaches to the development of an institutional culture of teaching, the greater the likelihood that individual faculty members will perceive that such leaders hold expectations for the professional choices they make in their teaching role performance that enhance student learning.
4. The greater number of approaches to the development of an institutional culture of teaching that the leaders of the central administration use, the clearer the expectations for faculty to make professional choices in their teaching role performance that contribute to the learning of their students.
5. The more chairpersons of academic department perform administrative duties and take actions that value undergraduate college teaching and contribute to the development of a culture of teaching, the clearer are the expectations communicated to departmental faculty members to make professional choices in teaching role performance that enhance student learning.
6. The clearer the expectations for faculty to make professional choices in their teaching role performance that contribute to student learning conveyed by the central administration of a college or university and by chairpersons of academic

departments, the more likely faculty members will adhere to the norms of undergraduate college teaching and will use the seven principles of good practice in their teaching.

7. Faculty members who perceive that they will be extrinsically rewarded (e.g. receive a substantial increase in pay, be reappointed, receive tenure or be promoted in rank) are more likely to engage in the scholarship of teaching, ask students higher order thinking questions in class, write examination questions that require higher order thinking, and use such pedagogical practices as active learning, collaborative learning and cooperative learning than are faculty who perceive that they are unlikely to receive valued extrinsic outcomes from such teaching efforts.

Recommendations for Testing This Theory

This theory fits the category of a middle-range theory.

Merton (1968) differentiated between grand and middle-range theory. Grand theory seeks to explain a wide range of phenomena, whereas middle-range theories endeavor to explain a limited range of phenomena. In the case of this theory, one seeks to explain the professional choices college and university faculty members make in their teaching role performance.

I offer five recommendations for the robust testing of this theory. I recommend topics for research rather than such methodological issues as the measurement of the various constructs embedded in the seven hypotheses delineated above. I entrust the research community interested in conducting the recommended research with making such necessary methodological decisions. The five recommendations are as follows:

1. Hypotheses 1 and 2 should be tested in different states of the United States. The states selected should vary in their use of performance funding, targeted budget allocations, mission differentiation, and outcomes assessment and program review. States that do not engaged in any of these policies and practices should be included. State-supported colleges and universities of those states selected to test these two hypotheses should also be chosen.
2. Hypotheses 2–7 should be tested in a range of different types of colleges and universities. The current categories of the Carnegie Classification of Institutions of Higher Education (2005) offer a basis for the selection of different types of colleges and universities. These categories include Doctorate-granting institutions (research universities: very high research activity, research universities: high research activity and doctoral/research universities), masters colleges and universities (larger programs, medium programs and smaller programs), baccalaureate colleges (arts and sciences, diverse fields, and baccalaureate/associates) and associate's colleges (two-year colleges). A range of such colleges and universities is necessary because of possible variation in support for each of these hypotheses across different types of institutions of higher education. For example, leaders

of the central administration of teaching oriented colleges and universities may engage in approaches to the development of an institutional culture of teaching to a greater extent than leaders of the central administration of research oriented universities.

Moreover, institutional type may also affect the choice of different aspects of faculty teaching role performance made by faculty members. Espousal of the norms of undergraduate college teaching, engagement in the scholarship of teaching, asking students higher order thinking questions in class and writing examination questions that require higher order thinking constitute aspects of faculty teaching role performance that may vary across different institutional characteristics. To elaborate, academic biologists tend to espouse greater disdain for some of the norms of undergraduate college teaching (e.g. condescending negativism, particularistic grading, personal disregard, uncommunicated details) than do faculty members in the disciplines of mathematics, history, and psychology (Braxton & Bayer, 1999). Because of their levels of disdain for such teaching norms, academic biologists may comply with these norms to a greater extent than academics in other disciplines. Moreover, faculty engagement in the scholarship of teaching varies across different types of colleges and universities as faculty members in liberal arts colleges tend to engage more in the scholarship of teaching than do faculty members in research oriented universities (Braxton et al., 2002b). The choice of asking students higher order thinking questions in class and writing examination questions that require higher order thinking may also vary across colleges and universities of varying degrees of undergraduate admissions selectivity (Braxton & Nordvall, 1985; Braxton, 1993; Nordvall & Braxton, 1996).

3. Individual faculty members should be the unit of analysis for tests of Hypotheses 6 and 7. As previously indicated Hypothesis 6 postulates that faculty members who perceive that the central administration and chairperson of their academic department expect faculty to make choices in their teaching that contribute to student learning are more likely to adhere to the norms of undergraduate teaching and use of the seven principles of good practice in their teaching. Hypothesis 7 posits that faculty will engage in those teaching practices that require greater effort if they perceive that they will likely receive a valued extrinsic reward for their teaching efforts. Faculty members from different academic disciplines should be selected as the differences among academic disciplines on a wide range of phenomena are "profound and extensive" (Braxton & Hargens, 1996, p. 35). Academic disciplines differ on their level of consensus on such factors as theoretical orientation, appropriateness of research methods and the importance of various problems (Kuhn, 1962, 1970; Lodahl & Gordon, 1972; Biglan, 1973). Physics and chemistry provide good examples of high consensus disciplines, whereas political science and sociology are low consensus academic disciplines (Biglan, 1973).

Differences in teaching occur between faculty in high and low consensus academic disciplines. Faculty in low consensus disciplines tend to be more oriented toward teaching, spend more time on teaching, express a greater interest

in teaching, and receive higher student course evaluations than do faculty members holding membership in high consensus academic disciplines (Braxton & Hargens, 1996). Academics in low consensus academic fields also display a greater affinity for practices and activities that improve undergraduate education than do academics in high consensus fields (Braxton et al., 1998). In addition, faculty members from low consensus disciplines tend to ask more questions requiring the synthesis of course content on their examinations than do faculty members in high consensus disciplines (Braxton & Nordvall, 1988). Thus, the choices of different aspects of teaching role performance made may vary between individual faculty members in academic disciplines exhibiting high and low levels of consensus.

4. The characteristics of individual faculty members may also influence their choice of the various aspects of teaching role performance. Gender and tenure status make up two of the characteristics of faculty that tests of Hypotheses 6 and 7 should encompass.

To elaborate, women faculty display a greater commitment to teaching than do male faculty members (Bayer & Astin, 1975; Boyer, 1990; Boice, 1992; Tierney & Rhoads, 1993). Gender differences in perceptions of good teaching also obtain. Women faculty members view a concern for the self-esteem of their students and a minimal emphasis on grades as characteristics of good teaching (Goodwin & Stevens, 1993). Women faculty also express more agreement with such undergraduate teaching norms as condescending negativism and personal disregard than do male academics (Braxton & Bayer, 1999). Consequently, gender differences on choices of different aspects of undergraduate teaching role performance might occur.

The tenure status of individual faculty members may also affect their choices of aspects of teaching role performance to enact. More specifically, new assistant, or untenured professors, tend to view good teaching as “good content” and place much emphasis on lectures that convey facts and principles (Paulsen & Feldman, 1995). They also display a hesitation to seek assistance in the improvement of their teaching. These proclivities of untenured faculty members may negatively affect their choices of those aspects of teaching role performance that contribute to student course learning.

5. The values, beliefs, norms and behaviors of student peer groups may affect the professional choices faculty make in their undergraduate college teaching role performance. Student classroom incivilities and student normative support for good practices in undergraduate education form the ways student peer groups affect faculty teaching role performance.

Students who display such classroom incivilities as disrespectful disruptions (e.g. talking while the instructor or other members of the class are talking, interrupting others while they are talking, reading the newspaper during class, receiving cellular telephone calls and departing the class before excused by the professor) and insolent inattention (e.g. students who fail to pay attention in class) (Caboni et al., 2004; Hirschy & Braxton, 2004) may lead faculty members not to select those aspects of teaching role

performance that require some level of time commitment and psychological energy to perform. Such student classroom incivilities might also provoke faculty to violate norms for undergraduate college teaching (Braxton & Bayer, 1999). However, the existence of student norms that rebuke either of these categories of classroom incivilities might prevent or reduce the effects of such incivilities on faculty choices in their teaching role performance. Students tend to rebuke insolent inattention, but not disrespectful disruptions (Caboni et al., 2004). Consequently, academics may experience insolent inattention less frequently than disrespectful disruptions in their classrooms.

Student normative support for such good practices as the encouragement of faculty-student contact, cooperation among students, and communication of high expectations (Caboni et al., 2002) may encourage faculty members to enact such good principles of undergraduate education. The asking of higher order thinking questions to students in class and on course examination questions may also occur as professional choices of faculty members because of student normative support for the communication of high expectations for student attainment.

Closing Thoughts

In closing, I offer the following thought. The theory of faculty professional choices in teaching role performance put forth in this chapter explains how faculty elect to engage in particular aspects of teaching role performance. However, prescriptive rather than descriptive best describes this theory. The formulations of the theory explain how faculty might make professional choices if the elements of the various formulations of the theory existed in reality. This theory describes those elements that should exist at the level of state higher education public policy makers and individual colleges and universities.

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Financial Aid and Student Dropout in Higher Education: A Heterogeneous Research Approach

Rong Chen

Introduction

Over the past several decades, a large body of research has studied student outcomes in higher education. Among them, many examined the relationships between financial aid and student dropout behavior. But this line of research focuses primarily on the effects of financial aid in general, paying limited attention to the differences in dropout behavior across socioeconomic and racial/ethnic groups and how financial aid influences these gaps.

In this chapter, I argue that it is important to consider the economic and racial/ethnic diversity of students when evaluating the effects of financial aid on student dropout. Given the heterogeneous nature of the student population, researchers in higher education need to explore the possible variations in aid effects on dropout risks across different subgroups rather than just specify average effects for the population as a whole. To achieve this goal, a comprehensive conceptual framework and a more appropriate analytic approach are needed. In addition, since St. John et al.'s (2000) extensive review of the economic influence on persistence research, an updated review of this line of research will help us continue to re-conceptualize student departure models from an economic perspective. In this chapter, I develop an alternative approach for investigating the differential effects of financial aid on student departure risks by integrating economic theories with theoretical frameworks from other disciplines. This heterogeneous approach pays particular attention to the role that financial aid plays in reducing dropout risk gaps across income and racial/ethnic groups.

The chapter first describes the importance of examining the variation in the effects of aid on student departure. It then reviews and critiques various theoretical approaches, particularly the economic approach, for examining student dropout risk. Third, although prior empirical studies and methodologies have generally promoted a better understanding of how financial aid affects student departure, they are nevertheless limited. This chapter highlights some of the merits and limitations of prior persistence/dropout literature, and provides a few suggestions for future research. Third, by expanding Heller's (1997) notion of price-demand, the chapter imports three economic concepts—liquidity constraints, price elasticity, and debt

aversion—and based on these concepts, introduces two hypotheses for use in the analysis of differential aid effects. Finally, the chapter presents a comprehensive conceptual framework and an alternative analytic approach for evaluating financial aid effects in future student dropout research.

The Importance of Investigating Differential Aid Effects on College Dropout Risks

Policy Background

Research in the United States has established that investment in higher education is beneficial to individuals (Berger, 1992; Perna, 2003), society (Bowen, 1997), and economic development (Bowen, 1997; Paulsen, 1998), and also reduces inequality in human conditions (Anderson & Hearn, 1992; Bowen, 1997; Park, 1996). Given the benefits of higher education, equal access to and attainment in colleges and universities has become a centerpiece of public policy toward higher education. In the 1960s, the federal government became extensively involved in student financial aid, aiming to offer equal educational opportunities to students, regardless of their economic status (McPherson & Schapiro, 1998). The three most common types of student financial aid are grants, loans, and work-study. Overall, financial aid, especially grants for needy students, has been an important resource for equalizing higher education opportunities. The last two decades, however, have witnessed a dramatic shift in college student funding from grants to loans, a decline in the purchasing power of the maximum Pell award (College Board, 2005a), and increasing tuition (College Board, 2005b).

Equal education is an important goal to be realized as the gaps between wealthy and poor in educational attainment still exist. For instance, among first-time freshmen who entered college during the 1995–1996 academic year, 56% of students from high-income families attained a bachelor's degree, while only 26% of low-income peers did the same (National Center for Education Statistics, 2003). These statistics provide evidence that problems of equity still persist for those from the lower socioeconomic classes. In addition, the increased popularity of state merit aid, which is distributed disproportionately to wealthier students, the increased use of merit-based relative to need-based grants in institutional aid awards, as well as revisions to the financial aid formula that opened the subsidized loan program to more affluent families, tend to exacerbate the equity problem (Dowd, 2004; Heller & Marin, 2002; McPherson & Schapiro, 2002).

In addition to the concern about inequality in educational attainment across income groups, another important issue that challenges educational equality is the racial/ethnic disparity in college outcomes. Overall, although the number of bachelor's degrees awarded to minority students has increased in the past decade, minority students are consistently under represented among bachelor's degree recipients

(Nettles & Perna, 1997; Perna, 2000). African Americans and Hispanics made up only 7.0% and 4.2%, respectively, among those who attained a bachelor's degree, while they represented 14.3% and 13.7% of the college-age population in the nation (Perna, 2000). In addition, minority students are found to be more sensitive to prices and less willing to use educational loans (Kaltenbaugh et al., 1999; St. John, 1991). The continuing financing changes will likely imperil the economic and social well-being of minority students since they have a disproportionately negative effect on the educational attainment of minority students (Hu & St. John, 2001). Further understanding of the influence of financial aid awards on dropout by race/ethnicity can help inform policymakers and institutional administrators about strategies that can promote educational opportunity for these historically disadvantaged students.

Purpose of the Chapter

There has been an increasing concern about the socioeconomic and racial/ethnic gaps in student dropout, but many studies in this field has been subject to several conceptual and methodological limitations, including insufficient consideration of the socioeconomic and racial/ethnic discrepancies in student outcomes, and limited studies for understanding the role that different types and amounts of aid play in reducing these gaps (Chen & DesJardins, 2008).

Given the persistent inequality in college student dropout risk, and the lack of research as to whether and how these gaps due to income and racial/ethnic differences can be narrowed, studies to further our understanding as to why student dropout patterns differ markedly between disadvantaged students and their better-off peers are in great need. Instead of repeatedly describing the continuing disparities in educational attainment, we need to focus on what specifically might be done to improve this condition. Research comparing students from different socioeconomic and racial/ethnic backgrounds in their responsiveness to various financial aid programs can be helpful for meeting this need. Thus, an alternative approach to evaluating financial aid effects on student dropout risks is crucial. It would also be very timely considering the wavering commitments to equal opportunities by the federal and state governments, and the debates in recent years over diversity in postsecondary education in American society (McPherson & Schapiro, 1998; Slaughter & Leslie, 1997).

Because of the large differences in student dropout rates between two-year and four-year institutions, and the fact that many students who attend two-year institutions do not have degree completion as their ultimate goal, this chapter focuses on dropout behavior in four-year institutions only. In addition, prior studies and related literature have often not differentiated between persistence and departure (Berger & Braxton, 1998; Cabrera et al., 1992a; Elkins et al., 2000; Milem & Berger, 1997; Moline, 1987; Pascarella & Chapman, 1983; Tinto, 1992). I therefore include in this review several persistence studies that have consequences for student departure research.

Theoretical Approaches to Examining College Student Departure

Five major theories are widely used for studying student departure: psychological, sociological, organizational, interactionist, and economic theories (Braxton & Hirschy, 2005; Tinto, 1992). Generally, the psychological approach emphasizes the impact of individual psychological attributes in the process of dropout; sociological and economic approaches focus more on the broader external social and economic forces; organizational theory regards student departure as affected by immediate organizational features; and interactionist theories stress the role of both individual and environmental forces.

Psychological Theories

Psychological theories view student departure as primarily influenced by attributes reflecting an individual's psychological characteristics. Personal characteristics, such as intellectual attributes or level of maturity, can be important in shaping a student's academic ability or affecting their motivation in academic study, which in turn influences the individual's departure behavior (Heibrun, 1965; Rossmann & Kirk, 1970; Summerskills, 1962). There are four major sub-theories for explaining persistence/dropout behavior (Bean & Eaton, 2000): attitude-behavior theory, the coping behavioral approach theory, self-efficacy theory and the attrition theory. Attitude behavior theory provides an overall structure for this line of research. The coping behavioral approach emphasizes a person's adaptation ability in a new environment. Self-efficacy theory stresses an individual's self-perception as capable of dealing with specific situations. And attribution theory focuses on whether an individual has a strong sense of internal locus of control. Based on these theories, scholars use several factors as predictors of student departure behavior, including intentions to stay, students' feelings about their adaptations to the environment, and the motivational component of academic and social integration.

Psychological theories of student departure, regardless of their particular focus, share the common view that departure is primarily a reflection of an individual's psychological response to the environment, and largely due to a student's personal ability or willingness to persist in college. This perspective contributes to the departure research in that it reveals an individual's internal factors that influence a student's decision to persist or depart. But by viewing persistence/dropout as primarily the consequence of individual students' internal strengths or weaknesses, this perspective fails to account for the important role played by external factors (Tinto, 1992).

Sociological Theories

In contrast to the more individual perspective of the psychological theories, sociological theories treat students' dropout decisions as a consequence of the social attributes of individuals, institutions, and society. Some of the important attributes

include socio-economic status, race/ethnicity, and opportunity structure that describe the individual's and the institution's place in the broader hierarchy of society (Tinto, 1992). Theories from the sociological perspective can be categorized into three groups: conflict theory (Clark, 1960), social reproduction theory (Bourdieu, 1973, 1977), and social attainment theory (Duncan et al., 1972; Featherman & Hauser, 1978). They all argue that, although individual skills and abilities are important in predicting students' dropout decisions, social and cultural capital as well as the greater process of social stratification is more central. In particular, proponents of social attainment theory (Duncan et al., 1972; Featherman & Hauser, 1978) maintain that family socioeconomic statuses influence children's educational and occupational attainment, which provide a theoretical foundation for the investigation of socio-economic stratification in higher education.

Sociological theories of student departure remedy the deficiencies of psychological theories by regarding the process of student attrition as the consequence of larger social stratification. The theories are useful for describing how broad social forces may impact student departure, but an over-emphasis on the role of external forces limits opportunities to explain the psychological and institutional attributes that might have an impact on the process of student departure.

Organizational Theories

Organizational theories are concerned with the impact of the college environment forces on student behavior (Berger & Milem, 2000). Compared to the psychological and sociological theories, which focus on the effects of individual and social factors, organizational theories assume that student dropout is analogous to turnover in the work-place. The organizational attributes of higher educational institutions, such as structure, size, faculty-student ratios, and institutional resources, may have a strong effect on students' socialization patterns, and therefore on their departure behavior as well. Bean's (1980, 1983) causal model of student attrition, developed from Price's (1977) model of turnover in work organizations, is representative of this group of theories. The major argument of this model is that colleges differ in their structural linkages to occupational and economic groups; hence, their capacity to allocate graduates to high status occupations also varies. Although organizational theories offer a framework for understanding dropout risks across institutions with different characteristics, they are relatively less developed and have been tested by fewer empirical studies.

The organizational perspective on student persistence/departure provides important inputs for understanding how institutional factors may influence student decisions. Nevertheless, it fails to effectively explain the mechanisms by which these factors can eventually affect students' decisions. Tinto (1992) argues that one reason for this failure may be that it does not include lower-level factors, such as students' interactions with peers and faculty, which might mediate the organizational effects of student behavior. More recently, Berger (2000a) has also reiterates that

organizational theories need to consider individual students instead of concentrating too much on student outcomes at the institutional level through the use of aggregated student information.

Interactionalist Theories

Interactionalist theories emerged in the 1970s and became well-developed in the 1990s. Rather than simply combining internal or external determinants as the psychological, social, and organizational theories usually do, this approach integrates the above three perspectives and treats the student departure process as reflecting a dynamic interaction between individuals and the environment (Tinto, 1992). It includes informal social organizations, such as student peer groups and classrooms, as well as personal interaction among students, faculty, and staff as important factors influencing student departure.

The early form of the interactionalist view employed the notion of “role socialization” and “personal-role fit” (Rootman, 1972). Later, a more complex and complete form was initiated by Tinto (1975, 1987). This new development is an extension of Spady’s (1970) work on connecting Durkheim’s (1951) theory of suicide to student departure. Its main point is that individual persistence in, and dropout from, institutions of higher education can be viewed as arising out of a longitudinal process of interactions between an individual with given attributes, skills, prior educational experiences, dispositions (intentions and commitments), and other members of the academic and social systems of the institution (Tinto, 1987). Experiences promoting students’ social and intellectual integration into college communities are likely to strengthen their commitment and therefore reduce departure risks.

The interactionalist approach provides a more inclusive view of the student departure process by integrating the psychological, social, and organizational perspectives. It emphasizes the impact of dynamic, reciprocal interaction between the environment and individuals, and offers an explicit model for testing hypotheses about student departure. Tinto’s interactionalist model is a classic in studying both persistence and departure research, and has been widely tested (Braxton, 2000; Braxton et al., 2004). Two weaknesses, however, must be noted. First, the role of academic and social integration is only partially supported by empirical results. Some have found the effects of social and academic integration to be non-significant (Nora, 1987). Second, interactionalist theories have not sufficiently considered economic factors. Although finances were added later, this model failed to take into account the role of financial aid and tuition price in student persistence (St. John et al., 2000).

The discussions above indicate that the theories from psychological, sociological, organizational, and interactionalist perspectives are complementary, with each one contributing a different insight not offered by the other. While these theories have laid a solid foundation for identifying how various individual, organizational and social factors may influence student decisions, economists have also offered insightful explanations to increase our understanding of how financial factors affect student departure.

Economic Theories

Studying persistence/dropout from an economic perspective is a more recent phenomenon. This approach is based on human capital theory (Becker, 1964; Psacharopoulos, 1987), and on supply and demand theory (Radner & Miller, 1975), and has produced a considerable volume of literature in the last decade or so.

Economists Schultz (1961) and Becker (1964) applied the concept of human capital to suggest that individuals derive economic benefits from investment in education, training, health and nutrition. Individuals can increase their stock of human capital through a variety of training and educational experiences. For higher future monetary and non-monetary returns, they can either choose to attend universities or select a low-paying job with a great learning potential. In each case, investment in human capital leads to higher productivity, which is rewarded by higher future returns. Rational individuals, as economists assume, weigh the expected costs and benefits when deciding to make an investment in human capital, such as higher education (DesJardins & Toutkoushian, 2005; Paulsen, 2001). From this analysis, each member of society decides whether, and how much, to invest in their own human capital.

Supply and demand is a fundamental concept for the theory of price determination in economics. Supply represents the quantity of a product or service that the market can offer at various prices, while demand represents how much people are able and willing to buy at those prices; the relationship between price and quantity demanded is known as the demand relationship. The correlation between price and how much of a good or service is supplied into the market is known as the supply relationship. Therefore, supply and demand theory suggests that the quantity of a product or service supplied or demanded is related to its price. A core element of this theory is that there is an inverse relationship between price and quantity demanded. When price increases, demand decreases, and vice versa.

Human capital theory contributes to research in student departure in that it treats education as an important investment for bringing in future returns to offset the individual's time, energy and money spent (Becker, 1964). Therefore, in the context of higher education, students' decisions as to whether or not to spend the money and persist are influenced by economic factors. Supply and demand theory justifies the view that college tuition and financial aid can influence student demand for higher education. Thus, similar to any other economic activities, the decision about persistence or departure is just a process for estimating one's payment capability and weighing the costs and benefits of investing one's scarce resources in different ways. Therefore, financial attributes of educational institutions, such as tuition and financial aid, have been incorporated in student departure studies. The assumption is that financial aid reduces net tuition, and therefore influences student dropout decisions.

Early economic theories and models of student persistence/departure examined the effect of finances (e.g., Cabrera et al., 1990; Voorhees, 1985), but factors such as interaction with peers and faculty, which have been shown to be significant in interactionist departure models, were not sufficiently considered. Although early

economic models have been criticized for having an incomplete view of student departure, the recent integrative economic models, such as the ability-to-pay model and the college choice-persistence nexus model, have been developed for a new understanding that can inform future research. For example, Cabrera and his associates (Cabrera et al., 1992a, b) viewed persistence as a complex process linking experiences with the institution, cognitive and affective changes, a student's commitments to the institution, and intent to persist. As an advancement of the prior approaches from psychological, social, organizational, and interactionalist perspectives, they added finances into the model to examine the impact of financial aid and college price. The other improvement in the economic approach was made by St. John et al. (1996), who established support for the proposition that there exists a nexus between the college-choice stage and a student's subsequent persistence in college. Financial factors were found to influence both student college choice and persistence. This updated economic approach has not only preserved the major construct of traditional theories and models but also provided a better understanding of student departure. By integrating finances into the interactionalist model and by connecting college choice and persistence, the economic models of student departure have provided a more comprehensive framework for researching student departure behavior. In higher education research, the economic approach has become very important for its ability to provide a rationale for public funding and the underlying rationale for using need-based financial aid to equalize educational opportunity (St. John, 2003).

While theories of human capital and supply and demand provide the foundation for examining financial aid effects, they have not stimulated much research on the differential effects of aid across individual groups in the student dropout process. Findings in the literature help identify the general effects of financial aid on student dropout risks but do not provide sufficient explanations as to why a particular type of aid might be more important to one student group than to another. To explore the differential effects of financial aid on dropout risks, I apply three additional important economic concepts: liquidity constraints, price elasticity, and debt aversion. Illustration of how these economic concepts advance this inquiry of student departure will be elaborated on following the critique of the empirical studies and the methodologies in the next section.

Empirical Research on Student Departure

Researchers in psychological, social, organizational, interactionalist, and economic approaches have identified a variety of factors that provide evidence for understanding the student departure decision process. Factors include student background characteristics, educational aspiration, pre-college preparation, financial factors and college experience. However, there are some notable limitations in these empirical studies: (1) the limited time perspective, (2) the problems in examining aid effects, (3) the limited attention to socioeconomic gaps, and (4) the lack of consideration of racial/ethnic group differences.

Time Perspective

With few exceptions (Chen & DesJardins, in press; DesJardins et al., 1999, 2002a; Ishitani & DesJardins, 2003; St. John et al., 1991), the literature on student persistence/departure adopts a limited time perspective. Researchers generally considers two points in time: the point of entry and the time when dropout is determined (Tinto, 1982). But as Murdock (1987) suggested, studies should measure departure over a longer period of time than just one semester, one year, or even two years, so as to better determine the temporal effects of different factors on student departure.

Examination of Aid Effects

The literature examining aid effects on student departure also poses several problems. First, the research often takes limited consideration of the longitudinal characteristics of student departure and the possible time-varying effects of aid. Student dropout is a time-dependent process, and treating it as time-constant may constrain researchers from exploring whether, and if so, how student aid effects change over time.

Second, researchers usually use an aggregated variable of financial aid, without accounting for possible differences by subtypes. Due to the unavailability of dollar amounts for the different types of financial aid, some studies simply used a variable representing the total amount of financial aid each year a student receives. This measure took only the total amount of aid into consideration, ignoring the fact that different types of aid might have different effects. Other studies used just one aggregated loan variable, either in dichotomous or total amount format, as a proxy for all types of loans. Intuitively, loans of different types have a different focus and benefits, and should thus weigh differently on students' departure decision. For example, the Perkins loans and Stafford subsidized loans are awarded based on financial need, with interest paid by the federal government during in-school, grace, and deferment periods. In contrast, the Stafford unsubsidized loans, which are non-need-based, require that students pay the interest shortly after receiving the loans. Since these different types of loans have different dollar values, it is reasonable to assume that the need-based loans would help students more than the non-need-based loans in preventing them from dropping out.

Third, interactions between aid and non-aid variables are often neglected, although it is possible that student aid effects may vary among subgroups (e.g., students from different socioeconomic and racial/ethnic backgrounds). For example, loans may help middle- or high-income students to persist and succeed in higher education, while having some loans or excessive loans may not help low-income students at all or may even increase their dropout risks. Treating aid effects as uniform does not allow us to differentiate the effects of financial aid if there are any.

Attention to the Socioeconomic Gap

As some scholars have observed (Paulsen & St. John, 2002; Walpole, 2003), higher education research has given only limited consideration to social class discrepancies in student outcomes. The same holds true for student departure studies. The most common approach that scholars take in departure studies is to control for socioeconomic differences rather than focus on how those differences may be reduced by educational interventions or policies. This omission of social class discrepancies has limited our understanding of the socioeconomic differences in student departure and the role that educational policies/interventions can play in reducing these gaps.

More recently, a few studies have started to take socioeconomic differences as the focus of research (Paulsen & St. John, 2002; St. John & Starkey, 1995; Walpole, 2003) by running separate regressions for different income groups and then comparing the coefficients. For example, Paulsen and St. John's (2002) analysis of class differences related to the financial nexus indicates that students from various income backgrounds responded differently to finances. Poor students were more positively influenced by grants, and compared to higher-income students, working-class students were more negatively affected by inadequate loan and work-study aid.

The studies cited above have significantly promoted our understanding of aid effects by family income, an issue often ignored in the prior literature. Nevertheless, comparison of differences in the coefficients of aid variables across income groups does not indicate the significance of the differential effects of aid. It was not until recently that Dowd (2004) examined the different effects of aid on students from different income groups by testing the significance of the interaction between aid and income. But Dowd's effort was constrained by cross-sectional data, which treats financial aid as time-constant.

Consideration of the Racial/Ethnic Gap

Although research on racial/ethnic differences in student persistence/departure predates minority students' becoming a critical mass in higher education (Rendon et al., 2000), small sample sizes for minority students limited the early researchers' ability to control for race and to detect racial group differences. Minority students were even excluded from the samples for the same reason. But over the past decade, there has been greater academic interest in minority students (Nora & Cabrera, 1993), enriching our understanding of departure behavior for them and contributing to public policies promoting equal educational outcomes across racial/ethnic groups. But as with the research on the socioeconomic gap in student departure, models that include race/ethnicity often treat it only as a control factor as a whole without closely examining the diversity within these racial groups, thus failing to test the differential effects of financial aid on student departure for different racial/ethnic groups.

A few student persistence studies, however, have investigated the aid effects by race/ethnicity. Results indicate that, in their persistence decisions, African Americans

(Hu & St. John, 2001; St. John et al., 2005) and Hispanics (Hu & St. John, 2001), compared with their White peers, are more responsive to student aid. In particular, grants and tuition had a substantial influence on persistence for African Americans, while loans were more effective for Whites than for other groups. These findings from persistence studies shed light on future student dropout research.

Methodology

Over the past three decades, student departure research has not only evolved in terms of theoretical frameworks and empirical investigations but has also gradually developed and improved in its research methodology. Methodological development, particularly the availability of data, new statistical methods, and computer software, has facilitated in-depth studies of student departure.

Data

A reliable examination of student departure at either the institutional or national level clearly depends on the quality of data. In early times, limited and inappropriate data was a major obstacle for a comprehensive investigation of student departure (Perna, 1998). Usually, data were from institutions or single institutions (Berger & Milem, 1999; Cabrera et al., 1992a, 1992b; DesJardins et al., 1999; Tinto, 1997). Detailed data at the institutional level about students and the institution allowed researchers to examine in depth what factors determine students' departure from a given institution. But institutional dropout is not the only type of departure behavior, as dropout students may transfer to other institutions. Among those transferred students, some successfully integrate into the new institutions, while others may eventually leave higher education system without returning. To take this latter group of students into account, scholars have started to use data at the national level (Cabrera et al., 1990; Dowd, 2004; Leppel, 2002; Paulsen & St. John, 2002; St. John et al., 1991).

In addition to the fact that institutional level data do not take into account transfer students, it poses a number of other limitations. First, institutional data are often small in sample size and in the number of dropouts, thus it is likely to cause unstable estimations if small-sample institutional data are used. Second, as Pantages and Creedon (1978) indicated, students from the same institution could be very similar in background, so the effect of socioeconomic status on student departure for the general population may be masked in a single institution study. The third problem is related to the examination of aid effects using single institution data. As proposed in St. John's (1991) literature review, "students in the same institutions are subject to the same tuition charges and the same aid packaging philosophies; therefore there might not be sufficient variation for aid awards to be statistically significant when the influence of student aid is examined at the institutional level" (p. 23).

McCreight and LeMay (1982) also note that single institutional studies generally report no relationship between the amount of aid and departure due to the lack of variance in students' unmet financial need. Fourth, most institutional studies are limited in time-perspective. Although some use the longitudinal research designs (e.g., Cabrera et al., 1990; Berger & Milem, 1999), the data are often gathered only at two or three points in time.

Statistical Methods

Early studies of student departure were constrained by methods available at the time. Initially, they were just descriptive reports of the patterns of departure, using demographic characteristics as sources of variation and providing little information on why students leave. Later, linear regression was applied (e.g., Pascarella & Terenzini, 1980), but this method failed to capture the dichotomous nature of the outcome variables of persistence/departure (Cabrera et al., 1990; St. John et al., 2000).

Recently, many studies (Cabrera et al., 1990; Leppel, 2002) have resorted to using more complicated analytical techniques, such as logistic regression, to remedy this deficiency. Logistic regression analysis is an appropriate technique for studying attrition because of the dichotomous nature of dropout as the dependent variable. Cabrera et al. (1990) also suggested that logistic regression analysis not only captures the probabilistic distribution embedded in dichotomized distributions but also avoids violating the assumptions of homoscedasticity and functional specification (Becker & Nelder, 1978; Weiler, 1987). It is worth noting, however, that linear or logistic regression using a static approach does not take into account the effects of financial aid on students' departure over time.

In the early 1990s, scholars (St. John et al., 1991) began to conduct sequential regression analyses, in which they created separate samples for each time period and ran a series of logistic regression models on each sample. This sequential analysis approach is an important step forward by treating student persistence/departure as a longitudinal process, and has contributed to a better understanding of the possible variation of financial aid effects between time intervals. Its limitation, however, lies in the fact that the impact of time on the student outcome was not fully explored and the effects of factors in previous time periods could not be controlled for in the estimation of subsequent outcomes.

More recently, event history modeling has been introduced to consider the temporal nature of student departure (Chen & DesJardins, in press; DesJardins et al., 1999; DesJardins et al., 2002a; Ishitani & DesJardins, 2003). This analytic technique has been frequently used in economic and social science research for investigating the occurrence and timing of events (Diggle et al., 1994). As student departure is a longitudinal process, and the factors affecting departure may be time-varying, longitudinal methods are suited to studying student departure. Compared to the logistic regression typically used for cross-sectional data analysis, event history methods have the advantage of being able to examine time effects and time-varying effects of covariates on student departure.

As DesJardins (2003) suggested, event history methods have been infrequently used in student dropout research for the following several reasons. First, the lack of statistical packages for analyzing longitudinal events has hindered researchers from using this method to study temporal processes. But with the addition of event history modeling to the latest versions of major statistical software packages, technological difficulty has become less of a concern. Secondly, longitudinal data were initially difficult to obtain because of cost and storage considerations. With methodological and technological improvement in data collection, longitudinal data are now much more readily available. Last, but not least, is the fact that this complicated statistical method is rarely taught to educational researchers in graduate schools. Thus, researchers who intend to study student departure should be encouraged to receive training in these analytical techniques.

Alternative Approach for Examining Differential Aid Effects

Thus far, this chapter has reviewed and critiqued three major components of the student dropout literature: theoretical perspectives, empirical research, and methodologies. In this following section, I argue that applying the results of the general aid effects to students from different income and racial/ethnic groups is not recommended when evaluating the effects of financial aid. An alternative and more reasonable approach is to make particular assumptions about different groups' decision-making processes. In the heterogeneous approach developed in this chapter, I use the economic concepts of liquidity constraints, price elasticity, and debt aversion to illustrate why students from different income and racial/ethnic backgrounds may respond to financial aid in different ways. I also propose two hypotheses that can be tested in future research to promote a better understanding of the role financial aid plays in equalizing educational opportunities.

Economic Concepts

The heterogeneous approach developed in this chapter is based on human capital theory and supply and demand theory. In addition, it proposes using the economic concepts of liquidity constraint, price elasticity of demand, and debt aversion to illustrate how subgroup students have different economic background, and thus respond differently to financial aid.

Liquidity constraint is a form of imperfection in the capital market indicating a limit on the amount an individual can borrow or a limit on the interest rate he or she can pay. A rise in the cost of borrowing often tends to prevent individuals from fully optimizing their behavior. This market imperfection often tends to have a greater impact on students from disadvantaged socioeconomic backgrounds because access to liquidity is crucial for them and they face higher borrowing costs than do their

counterparts with greater advantages. For example, increases in Pell grants and merit aid, which reduce net tuition, may help better reduce liquidity constraint problems for low-income students.

The price elasticity of demand is a ratio of proportionate change in quantity demanded by proportionate change in price. For example, if a 2% decrease in net tuition due to an increase in financial aid resulted in a 1% increase in enrollment, the price elasticity of demand would be equal to approximately 0.5. A higher level of price elasticity indicates a higher level of sensitivity to changes in price. The price elasticity of demand is influenced by a variety of factors, including the proportion of income required by the product. Products requiring a larger portion of consumer income tend to have greater elasticity. In the higher education context, compared with their higher income peers, low-income students pay a larger proportion of family income for college education. Thus, they may have a relatively higher level of price elasticity and more elastic demand for higher education, while high income peers' demand is relatively inelastic. As a result, low income students tend to be more sensitive to net tuition changes through financial aid.

The third concept that helps explain the possible differential effects of financial aid is debt aversion, a reluctance to incur debt. Students from different income backgrounds may have different views of debt. Compared with their higher income counterparts, students from low-income families often have a lower threshold for risk of indebtedness. Consequently, increases in financial support through grants or merit aid can reduce their anxiety about the costs they will face. Alternatively, decreased aid and the perception of rising levels of debt will likely discourage their persistence.

Hypotheses for Testing Differential Aid Effects

Based on the economic theories and concepts and the main effect bias, I develop two testable hypotheses for a better understanding of the role of financial aid in equalizing educational opportunities.

Hypothesis I: Aid types and amounts will have varied impact on student departure based on level of family income. In other words, there is an interaction between family income and the type and amount of aid received. The rationale for this hypothesis derives from the fact that low-income students have higher levels of liquidity constraints, price elasticity, and debt aversion, and are thus more sensitive to net tuition and financial aid changes. Since loans require that students pay back the principle plus interest, and work study aid requires students to work in order to be qualified, their effects on student dropout behavior may be different from the larger Pell grants or merit aid, which reduce net tuition. It is possible that Pell grant or merit aid decreases the dropout probability among low-income students more than that of students from middle or high income families. However, the strength of the impact of loans and work-study on the student dropout decision may not be the same.

Hypothesis II: For aid recipients, the effects of aid amounts on dropout may vary based on their race/ethnicity. The logic is similar to the income hypothesis above: minority students may be more sensitive to net tuition and financial aid changes and are also more debt-averse relative to their White counterparts. The rationale to support the test of this hypothesis is that the impact of aid may be mediated by some unobservable factors such as cultures and value differences that are distinctly related to racial/ethnic groups. Although there is no empirical research on how cultures and value may mediate aid effects on student departure, economists have found that differences do exist in economic decisions across racial and ethnic groups. For example, compared with minorities, Whites tend to exhibit less risk-averse preferences (Benjamin et al., 2007), and relative to Whites, Asian Americans are more likely to participate in tax-deferred savings account (Springstead & Wilson, 2000). These economic studies suggest that cultural factors may contribute to racial/ethnic differences in economic decisions. Given these findings, it is reasonable to hypothesize that students from diverse racial/ethnic backgrounds may respond to financial aid changes differently. Minority students may be more sensitive to changes in need-based aid like Pell grants in their dropout process.

Recommended Conceptual Model

To develop a more inclusive conceptual framework for assessing the effects of student aid policies on reducing dropout risks, it is important to not only consider the sub-group variations, but also rethink the common assumptions underlying the evaluation of financial aid effects in higher education research. Thus, in addition to theories from psychological, sociological, organizational, and interactionalist perspectives, it is necessary to take into account human capital and supply and demand theories, along with the issues of liquidity constraints, price elasticity, and debt aversion. This conceptual model includes the outcome variable and eight major constructs for independent variables, namely student background, educational aspiration, pre-college preparation, financial factors, college experience, institutional characteristics, interaction effects, and time in college.

Dependent Variable

Student dropout is a measure of the flow of students out of higher education institutions. Three major types of departure are identified in the literature: stopout, institutional departure, and system departure. Stopout students often come back after a short period of disenrollment, institutional dropouts may transfer to other institutions; and system departures are those who leave higher education for good and whose behaviors could not be observed in stopout or institutional departure studies. Generally, stopout and institutional departure are of greater interest to institutional stakeholders, who are responsible for the policies and programs designed to

improve student persistence within particular institutions; system departure is often the focus of research and policies at the state and national level. Considering that student dropout from higher education has been a nationwide issue for decades (Tinto, 1987, 1993), and considering the longitudinal nature of this behavior, it is appropriate to define the dependent variable as system departure during an observation period that is long enough to observe most students' graduation. A good example of the possible dataset to use is Beginning Postsecondary Students (BPS: 96/01), a national survey that tracks cohort of students who began their postsecondary education during the mid 1990s over a six-year observation period.

Independent Variables

Next I discuss the independent variables to be incorporated into this model. In general, researchers from psychological, sociological, organizational, interactionist, and economic perspectives have identified various factors influencing student departure. These factors can be rearranged into eight clusters of variables comprising student background characteristics, educational aspirations, pre-college preparation, college experience, organizational effects, financial factors, time, and interaction effects. Because the first five clusters of variables are commonly identified in the literature, I mention them here only briefly, paying more attention to the remaining three clusters (i.e., financial factors, time, and interaction effects), which are central to the proposed model.

Student Background Characteristics

A variety of background characteristics are found to be related to student dropout and are often used as control variables. These factors are students' gender, age, race/ethnicity, family income, and parental education. It is worth noting that family income and parental education are examined separately in this model because some evidence (Paulsen & St. John, 2002) indicates that family income is far more complex than is communicated by the aggregated socioeconomic status (SES). In the proposed model, family income will be included in the baseline model for exploring whether there are income gaps in dropout risks. It is then used to divide the sample for subgroup analyses. If found to be significant, this variable will be used in the full model as main effects and as a part of the interaction terms to examine the effects of financial aid on reducing dropout risk gaps by family income. The same process applies to the use of the race/ethnicity variable.

Educational Aspiration

In addition to student background characteristics, student educational aspiration is another important variable to be included in the conceptual model. The measure of this factor often represents the highest level of education a student plans to achieve.

Pre-College Preparation

As measures of examining students' academic performance in high school and qualifications to graduate and go to college, high school grade point average (GPA) and college entrance examination performance are usually used to control for students' academic ability. Among them, college entrance examination performance is often measured by SAT or ACT scores. An alternative measurement is an indicator named the "merit index" (St. John et al., 2001), which quantifies the relationship between a student's college admission score and the average score for all college-bound students within the same school during the same test administration period. The authors compared the effects of SAT and the merit-aware index on within-year persistence of first-year college students and found that this merit index predicts college persistence about as well as the SAT. Thus, in analyzing differential aid effects on student dropout risks, researchers may apply traditional indicators, such as SAT or ACT scores, or use this merit index as an alternative indicator in departure research.

College Experience

Apart from student background characteristics, educational aspirations, and pre-college preparation, student experiences in college are also shown to be related to student departure from higher education. Some of the attributes are found important in predicting dropout include college GPA, major fields, academic integration, and social integration. Academic integration is a major construct in Tinto's (1975, 1993) integration model, which includes structural and normative dimensions concerning an individual's integration with the social systems of a higher education institution. Students' satisfaction with faculty and with the quality of instruction and curriculum, and academic advising are used to represent this attribute. Social integration concerns the degree of congruency between an individual and the social systems of a higher education institution. Some of the major variables examined include students' interaction with faculty and their interaction with their peers.

Organizational Characteristics

Institutional attributes are expected to be related to student departure (Tinto, 1987; Berger, 2000a, b). The most studied organizational factor in the dropout literature is institutional control, which indicates whether the institution is public vs. private.

Financial Factors

In addition to student background characteristics, educational aspirations, and pre-college preparation, differential aid effect analyses should incorporate financial factors including students' perceptions about college costs and variables indicating financial aid, college price, and labor market conditions.

Perceptions About College Costs

Some researchers (St. John et al., 1996, 2005) have argued that the reasons students choose to attend college could be considered dimensions of initial commitments, which may influence subsequent persistence. Examinations of the nexus between persistence and the influence of a set of college-choice variables indicate that two finance-related choice factors, namely choice because of low tuition and choice because of financial aid, are significant and are negatively associated with persistence. The evidence for a nexus between student choice and persistence suggests that financial-choice factors, including choosing a college because of low-tuition or financial aid, should be considered in examining student dropout behavior.

Financial Aid

Investigation of student aid effects on departure has gone through roughly five stages. Early on, the focus of study was student perceptions about aid. It was common to examine students' attitude toward whether financial aid mattered or not, rather than the actual type or amount of aid received. In the second stage, researchers adopted a rough measure indicating whether or not students received aid, regardless of type (Astin, 1975; Stampen & Cabrera, 1986, 1988). But scholars soon found that the effects of aid may differ by aid type, thus expanding the scope of research to analyzing the impact of different aid types (Nora et al., 1996; Perna, 1998; St. John & Starkey, 1995). This aid-type research focused chiefly on behavioral differences between aid recipients and non-recipients of a certain type of aid. This line of research helped differentiate the effects of different types of aid, such as grants, loans, and work-study, on student departure. More recently, scholars have come to realize that detailed information about financial aid would be lost if only aid types rather than aid amount variables were used. Thus, the measure of aid amount has been integrated into research models (DesJardins et al., 2002a; 2002b; Paulsen & St. John, 2002; St. John, 1990). The aid amount research focuses on the effect of the amount of certain types of aid on student departure. Research on the timing of aid represents the newest trend in the student persistence/departure literature. Using a longitudinal approach, researchers (Chen & DesJardins, in press; DesJardins et al., 1999; Ishitani & DesJardins, 2003; St. John et al., 1991) have examined how the effects of aid vary over time. By incorporating the temporal characteristics of aid receipt, this group of longitudinal studies has advanced student dropout research and promoted a better understanding of financial aid effects.

The brief review of the departure research on the effects of financial aid leads us to several conclusions. First, different types of aid are found to affect students' dropout behavior differently. But the literature is not clear as to which types of aid have the greatest impact (Pascarella & Terenzini, 2005). In most studies, grant aid is found to have a positive effect on persistence (Astin, 1975) and negative effect on departure (DesJardins et al., 1999), while in a few research (Moline, 1987; Peng

& Fetters, 1978), no significant relationship is discovered. For loans, Voorhees (1985) found that Federal Perkins Loans have a strong positive impact on persistence, while Peng and Fetters (1978) asserted that loans are not related to persistence. Other researchers (Astin, 1975; Hochstein & Butler, 1983; St. John & Starkey, 1995) have discovered that students who take out loans are less likely to persist. In the review of college impact, Pascarella and Terenzini (2005) conclude that work-study assistance generally increase the chance of persistence. But St. John and Starkey's (1995) study indicates that the amount of work study is significant and negatively associated with persistence for students from low- and middle-income families. Too much self-help could be problematic, at least for some students.

Second, only a few studies examined the differential effects of financial aid on the departure decisions for students from divergent backgrounds. In the past two decades, two important pieces of research on college *access* (Leslie & Brinkman, 1987; Heller, 1997) put forward a price-demand notion illustrating that price sensitivity generally lessens as income rises in their college-going decision-making process. More recently, a few studies (Hu & St. John, 2001; Paulsen & St. John, 2002; Perna, 2000; St. John & Starkey, 1995; St. John, 2003) took a major step forward by investigating the variations in aid effects in students' persistence decisions. This differential approach (St. John, 2003) examines aid effects by dividing student population into different income or racial/ethnic groups and conducting subgroup analyses. These exploratory studies found that student aid effects are not uniform, but vary by income and racial groups. For example, both grants and work-study aid were found to exert unequal influences on students with different family incomes (St. John & Starkey, 1995). Loans even have negative effect on African-American students (Perna, 2000). Although another study found no significant difference in the effect of loans by income quartile in a sample of full-time students in the public four-year sector (Dowd, 2004), the author speculated that the failure to find differential effects may be due to the small sample of students in the upper income quartiles.

Given inconsistent findings in the literature, studies on student dropout risks to need to include aid measures that represent the amounts of each type of financial aid students receive each year. These aid measures are included in both the baseline and full model as main effects, and are also included as a part of the interaction terms in the full model when post-estimation tests are significant.

Price

Another important predictor in the proposed model is college price. Although the Price-Response Approach was initiated early on (Astin, 1975; Murdock, 1987; Stampen & Cabrera, 1986, 1988), there were a limited number of studies on the effects of price on student departure due to unavailability of suitable data in early years. Among the limited studies, findings indicated that students usually did respond to college tuition prices in their persistence decisions (Heller, 1997, 1999; St. John, 1990). With a few exceptions, most studies found that tuition charges are negatively associated with student persistence, even after controlling for potentially confounding variables such as student background characteristics and college experience (Pascarella & Terenzini, 2005).

Researchers (St. John & Starkey, 1995) discovered that financial analyses in higher education before the 1980s assumed that student enrollment responded only to net price (usually constructed as the difference between tuition and financial aid); however, this net price approach has proved to be problematic. Students actually may respond to tuition and financial aid differently. Thus, the conceptual model proposed in this chapter proposes that, instead of using a single variable indicating net price, two separate measures of financial aid and tuition should be included to examine differential aid effects on student departure.

Labor Market Conditions

It has been argued that changes in labor market conditions may influence student demand and that these external influences have been systematically considered in previous studies (Dresch, 1975). Studies using time series data suggest that the labor market conditions can have an impact on college attendance in several ways. For example, Paulsen and Pogue (1988) found that the response of a college students' attendance to labor market changes depend on its curriculum: for a given selectivity classification, colleges with an emphasis on traditional arts and sciences had greater enrollment growth when the labor market condition was improving, while colleges with an emphasis on occupational fields had greater enrollment growth when the labor market condition was deteriorating. They also suggested that many colleges added new high-demand occupational programs and even dropped some less popular traditional arts and science programs in an apparent attempt to match more closely their curricular offering with the new patterns of student demand.

Some researchers have used employment as an indicator of the conditions of the labor market and have examined the relationship between employment and departure. In Pascarella and Terenzini's (1991) review of the literature, part-time employment on campus is concluded to have a positive impact on year-to-year persistence. DesJardins et al.'s (1999) study finds that on-campus employment other than work-study lowers the risk of stopping out. Some researchers have also investigated the effects of hours of employment on student dropout behavior (Iwai & Churchill, 1982; Terenzini et al., 1996), and found that dropouts tended to work longer hours than those who persisted. Thus, to control for American labor market conditions, this proposed conceptual model includes an indicator that measures students' employment on and off campus.

Time in College

Undergraduate students experience a series of changes and transitions that influence their growth from freshmen year to graduation (Astin, 1993). From a theoretical point of view, Tinto (1993) argued that, "a general theory of student departure, if it is to be fully explanatory, must be able to account for the latter (long-term) as well as the former (short-term) mode of student departure" (p. 88).

Although it has long been acknowledged that student departure is a longitudinal process (Spady, 1970; Tinto, 1975), studies taking time into account have appeared only recently. Some empirical evidence has been found to support the longitudinal investigation of student departure. Traditionally, the first year of college, especially the first semester, is a critical period in a student's academic career (Tinto, 1993); sophomores, juniors, and seniors are found to be much more likely to persist than freshmen (Tinto, 1987, 1993). However, scholars have recently shifted their attention from first year students, revealing that departure is also a problem in the years after some initial success in college (Nora et al., 2005). In addition, studies using longitudinal methods have found that the strength and direction of the factors related to student departure such as financial aid, may change over time (Chen & DesJardins, in press; DesJardins et al., 1999; Ishitani & DesJardins, 2003).

The temporal analysis unit in event history modeling depends on the availability of data. In higher education studies, most longitudinal data are collected on a yearly basis; thus, information about the outcome and independent variables are often only available for each academic year, instead of each semester or month. Consistent with most studies (Chen & DesJardins, in press; DesJardins et al., 1999; Ishitani & DesJardins, 2003), this conceptual model suggests using the academic year as the temporal analysis unit.

Interaction Effects

Most prior research on student departure ignored interaction effects, thereby bringing a "main effects" bias to their results. As Singer and Willett (2003) noted, one of the many possible misspecifications of a statistical model is the failure to take into consideration significant interaction effects between covariates. Almost every investigation of human behavior suggests that predictors' effects may differ depending on an individual's background and culture. However, most of the models in the student departure research presented in substantive journals has emphasized main effects and ignored any possible interactions. Only a few studies have compared the effects of tuition or financial aid on student departure/persistence for different income groups by running separate regressions. However, as Chen and DesJardins (in press) point out, these studies are still limited for not considering the interaction effect test. In order to avoid a "main effects" bias, researchers need to incorporate a formal statistical test for the difference between the coefficients for different groups (Jaccard, 2001).

As discussed above, failure to explore interaction effects is one of the major methodological deficiencies in student departure research. Without knowing whether and how some intervening/policy factors may influence students from divergent backgrounds, it is difficult to help policymakers target their interventions or policies to reduce the departure gap across various student groups.

Nevertheless, a purely data-driven search for interaction effects is not recommended. Based on the findings from literature and the hypotheses proposed, three sets of interactions are suggested for future research on financial aid and student

departure. First, in order to examine what types and amounts of aid are relatively more effective in reducing the observed dropout gap by income level, a series of interactions between income and all types of financial aid are needed. Second, a similar set of interaction terms must also be included to test the interactions between race/ethnicity and financial aid. Third, since the effects of financial aid may vary over time, it is necessary to include interactions between student year in college and financial aid.

Model Specification Issues

Before using the proposed model for student dropout research, three issues must be considered in model specification: multicollinearity, selection bias, and complex survey design characteristics. Multicollinearity occurs when two or more predicting variables are highly correlated, which means they essentially measure the same construct and contain redundant information. Severe multicollinearity leads to larger standard errors and unstable estimated coefficients (Devore & Peck, 2001). When using the proposed model, researchers need to perform correlation tests—*including calculation of tolerance values or variance inflation factors*—on the independent variables to avoid potential multicollinearity problems.

The second model specification issue is related to selection bias. As some scholars have observed (DesJardins et al., 2002b; Weiler & Pierro, 1988), many college choice and departure studies have incorporated some additional factors, such as whether a student delays entry, attends college full or part time, and lives in an on-campus residence hall or not into the models. The association found in some of the studies between full-time attendance and persistence, however, “may have arisen because the students selecting those choices had more of unmeasured factors that influenced both, not because of any true causal relationship between attendance status and persistence” (Weiler & Pierro, 1988, p. 264). Individual students with particular measured or unmeasured characteristics choose their program status non-randomly, which implies that the significant effect does not actually reflect a true causal influence of the program status on persistence. Some scholars (DesJardins et al., 2002b; Weiler & Pierro, 1988) cautioned against using these kinds of factors in investigating student departure. Other researchers (Alon, 2005; DesJardins, 2005) also pointed out that it is important to control for the relationship between aid eligibility and college outcomes, because the effect of aid received may be due to non-random selection into aid eligibility. Therefore, adjusting for self-selection in educational research is an area that requires much more attention and study. A few methods to deal with selection issues include propensity score matching methods and regression discontinuity analysis, etc. These methods combined with longitudinal analytic techniques could reduce selection bias in analyzing the effects of financial aid and push this line of research even further.

The third issue is associated with the analysis of survey data. Large-scale secondary data available from the National Center for Education Statistics (NCES) are often

designed with complex survey design characteristics, including unequal probabilities of selection, stratification, and clustering (NCES, 2002). It is important to take these characteristics into account when analyzing the data because neglecting them often leads to smaller standard errors estimates and p-values, in turn falsely producing significant coefficients (Thomas & Heck, 2001). Therefore, when using large-scale secondary datasets to study student dropout risks, researchers should utilize corresponding weight, strata and cluster variables to account for the complex survey design.

Suggested Approach for Analysis

Statistical Methods

Static analytic methods, such as logistic regression, etc., are appropriate and widely used for cross-sectional data. But as I argued in prior sections that student persistence/dropout is a temporal process, it is proper to use longitudinal data and longitudinal methods. One of these methods—the event history modeling (or survival analysis)—fits well for the study of student dropout risks. First, this analytic technique can deal with observations that are censored, which is a missing data problem that traditional statistical methods are not designed to remedy. Second, event history methods are able to incorporate variables whose values change over time. For example, in student dropout studies, the types and amounts of financial aid a student receives may change from one year to another. But traditional techniques are not easily adapted to take these time-varying covariates into consideration. Event history methods are, however, explicitly designed to deal with time-dependent covariates (DesJardins, 2003).

Originally developed by biostatisticians, event history analysis has often been applied in the medical, economic, and sociological fields of research (Allison, 1995), and has only been used to study the timing of educational events more recently (Willett & Singer, 1991). It is now a preferred analytical tool for investigating how multi-faceted factors influence student dropout over time (DesJardins, 2003). For this alternative framework specifically, this analytic method allows us to determine whether certain types and amounts of financial aid have effects that change over time, and how other various factors are related to student dropout risks at different points over a student's academic career.

There are two major types of event history models, depending on how the time-of-event is measured (Yamaguchi, 1991). One type is called “continuous-time methods,” such as Cox's method, which assumes that the time of the outcome event is precisely known. In the fields of medical and engineering research, continuous-time event history methods are often used because the event times are often precisely recorded. The other type of event history methods is “discrete-time methods,” in which time is often measured in discrete units of time. For example, in educational studies, time is often measured in semesters or years, so naturally discrete-time event history methods are more appropriate. The second consideration concerns the number of

ties in the data. Events have ties when two or more subjects in the sample have the event at the same time (Singer & Willett, 2003). The use of Cox's method for proportional hazards models would lead to a serious bias in estimates if the data had too many ties. Discrete-time models are recommended as an appropriate approach for handling ties without introducing bias (Yamaguchi, 1991; Singer & Willett, 2003). Given the nature of the time measured and the existence of many ties in most data for educational research, this proposed framework uses discrete-time event history methods.

Analytic Approach

Based on the conceptual model discussed above, a three-step approach is recommended for data analysis. The first step is to fit a baseline model that uses the whole sample and incorporates all of the independent variables except interaction effects. Following is the equation for this baseline model

$$\text{Logit } h(t_{ij}) = [\alpha_1 D_{1ij} + \alpha_2 D_{2ij} + \dots + \alpha_J D_{Jij}] + [\beta_1 X_{1ij} + \beta_2 X_{2ij} + \dots + \beta_p X_{pij}]$$

where the risk of student dropout is a logit function of two sets of predictors: time (Ds) and Xs (other independent variables). Xs may be time-invariant variables such as student race/ethnicity, SAT score, high school GPA, or institutional control, but may also include time-varying regressors such as student aid (the amount of aid a student receives for Pell grant, loans, or work study aid in each academic year). Fitting the baseline model facilitates a general understanding of the income and racial/ethnic differences in dropout risks as well as the effects of financial aid for the sample as a whole.

The second step is to conduct subgroup analyses, which means running a separate analysis on each income and racial/ethnic group. For example, if we want to do subgroup analyses by income, we need to divide the whole sample into sub-samples that represent students from different income levels. Once the samples are divided, we use the baseline model and conduct event history analysis on each income-group sample. The income variables need to be first removed from the baseline model, however, when conducting subgroup analyses by family income. The procedure for subgroup analyses by race/ethnicity is the same. The purpose of subgroup analyses is to detect whether there are differences in aid effects by income and race/ethnicity. Of course, dividing the data into subgroups often reduces studies' power to detect differential aid effects because the sample sizes are reduced. In addition, whether or not aid effects are significantly different should be determined through formal tests of interaction effects. Thus, this subgroup analyses step is exploratory in nature, and additional steps will need to be taken.

The third stage of analysis involves a series of tests for interaction effects using the whole sample and examining the variation of income and racial/ethnic differences in dropout risks as a function of financial aid. To avoid the "main effect" bias discussed earlier, two sets of interaction terms (income and aid; race/ethnicity and

aid) are added to the baseline model. Each set of interactions is incorporated into the baseline model independently, and each model with a group of interaction terms is then compared with the baseline model using a post-estimation test (e.g., -2 log-likelihood ratio test or Wald test). The purpose of performing post-estimation tests is to check whether the addition of interaction terms improves the model fit to the sample data. If a post-estimation test suggests that a specific set of interaction terms are significantly different from zero, then we need to include the interaction terms because the model with interaction terms provides for a better fit than the baseline model. After all these interaction effect tests, we may then fit a full model that simultaneously includes all significant interaction terms identified through the prior significance tests.

Interpretation of the Interaction Effects

Because interaction effects are often difficult to conceptualize, the interpretation of the results deserves careful attention. While many articles on logistic regression introduce general strategies for testing interactions, few provide concrete tools for understanding and interpreting the coefficients for the interaction terms. A good approach to interpreting the results of the interaction effects is to calculate the predicted probability of the outcome for each income and racial/ethnic group, and then present the results in tables or graphs (Jaccard, 2001). Refer to Chen and DesJardins' (in press) article for an example of how to interpret interaction effects using this approach.

Conclusion

With persistent socioeconomic and racial/ethnic gaps in college student dropout risks, and the dramatic shift in financial aid policies, there is an urgent need for understanding how financial aid can influence these inequalities in higher education in specific ways. This chapter provides an alternative perspective that can be used to further explore the differential aid effects on student dropout risks. Currently, most studies on student dropout from higher education tend to assume that financial aid exerts a uniform effect on students, ignoring the fact that the student body is heterogeneous and may respond differently according to income and racial/ethnic background. Specifically, these studies are limited in at least two ways. Failing to address variations in response to financial aid among different student groups, they do not have sufficient explanatory power to account for the ways in which finance influences students' behavior in different contexts. In addition, neglecting the longitudinal nature of student dropout may lead to a failure in accounting for the possible time-varying effects of financial aid.

In this chapter, I argue that investigations of financial aid effects on student dropout risks can be conducted using a heterogeneous approach that considers various

levels of student responsiveness to financial aid changes over time. First, it includes an understanding of how student subgroups respond to financial aid differently; second, it considers whether these differences are significant enough to narrow student dropout risk gaps in a longitudinal process.

As noted earlier, some scholars' research (e.g., Heller, 1997; St. John, 2003) is an important step forward in explicitly examining financial aid effects by different student groups. The alternative model and approach presented in this chapter is an attempt to deepen and expand St. John's (2003) "differential approach" and the notion of price demand explored by Leslie and Brinkman (1987) and Heller (1997). This heterogeneous approach provides additional power to explain how students from divergent social backgrounds may behave differently in their dropout decision. It also allows the examination of differential aid effects on dropout risks over various points in the time of students' academic careers. In addition, this approach may be extended to studies on college success gaps, as well as policy interventions that target at narrowing inequality in higher education. It should be noted, however, that this heterogeneous approach is meant to provide one means for understanding the effects of financial aid on student dropout risks. I hope that scholars with an interest in this area will look for more ways to investigate how financial aid influences student departure behavior.

Estimating the effects of financial aid on student persistence in and dropout from higher education is by no means straightforward (Heller, 2003; Pascarella & Terenzini, 2005). The combination of amounts, forms, and sources of financial aid that students receive can be very complex, and the funding levels and aid eligibility rules can change frequently (Pascarella & Terenzini, 2005), presenting formidable challenges for a thorough investigation of the role financial aid plays in reducing dropout risk gaps. However, with continual effort by scholars from various disciplines, more and more cutting-edge studies will further illuminate the divergent effects of financial aid, which will help policy-makers to target their policies for promoting equality in American higher education.

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Theorizing Research Policy: A Framework for Higher Education

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Introduction

As governments continue to view research activity as a tool for economic development, both locally and nationally (Singh & Allen, 2006), academic knowledge generation has become firmly embedded within the political economy (Marginson & Rhoades, 2002; Rhoads & Torres, 2006; Torres & Schugurensky, 2002). Whereas research occurs in the private sector and in corporate-funded centers, publicly-funded academic research constitutes a substantial portion of overall research activity and also positively affects industrial research and development (Cohen et al., 2002). Even research conducted outside of academe is dependent upon the training and certification of scientific experts and technicians, a function that is central to higher education (Seashore et al., 2007). Yet, as fundamental as research activity may be to higher education (and as higher education is to research activity), research policy is not often discussed in the higher education literature.

Research policy can be defined as a set of policies at various levels that concern the *mission, support, management, and translation* of research.¹ Given the predominance of colleges and universities as sites of research activity and training, it is difficult to explain why the topic of research policy has not been widely examined in the field of higher education. This is particularly curious in the United States, where the field of higher education is well developed and research is a core activity in many colleges and universities. Overlooking research policy has far-reaching implications for our ability to contribute to a vibrant area of academic discourse that is currently emerging as a key topic in other areas of the social sciences. Turning greater attention to research policy will also enable higher education

¹For the purpose of this discussion, I utilize a definition of “policy” that is broader than “public policy,” which occurs at the governmental and intergovernmental levels and concerns the distribution of public resources for the social good as determined by the state. Research policy is definitively part of the public policy process, but it is also seen at the levels of institutions and higher education systems. In addition, “research” is here broadly understood and inclusive of the methods of inquiry found in the sciences, social sciences, arts, and humanities.

to maintain social relevance as a field and to build rapport with the constituencies who are charged with making decisions regarding research funding and assessment in our knowledge-intensive society. Furthermore, by not contributing to this dialogue in a substantial way we allow research policy to be defined, formulated, and implemented without the critical and practice-oriented perspectives of higher education scholarship.

A review of articles appearing between 2002 and 2006 in three leading higher education journals revealed very few that touched upon aspects of research policy, even indirectly. In the case of the *Journal of Higher Education* (JHE), only one article in that five year span, "Commercializing Academic Research: Resource Effects on Performance of University Technology Transfer" by Powers (2003), focused entirely on an activity (technology transfer) that can be considered a typical unit of analysis within research policy studies. Other articles in JHE were marginally related to research policy by way of topics such as graduate students and the research function of universities (Marsh et al., 2002; Rhoads & Rhoades, 2005), faculty research performance (Fairweather, 2002; Marsh & Hattie, 2002), and the connection between science curriculum and economic development (Bradshaw et al., 2003).

In *Research in Higher Education* (ResHE), another article by Powers (2004), titled, "R&D Funding Sources and University Technology Transfer: What Is Stimulating Universities to Be More Entrepreneurial?" was the most directly connected to research policy of those appearing in the years 2002–2006. Indeed, the topics covered in ResHE were similar to those in JHE, with research policy only tangentially referenced in articles on faculty research productivity (Sax et al., 2002; Smeby & Try, 2005; Stack, 2003; Toutkoushian et al., 2003) and the effects of sponsored research activity on student performance (Kim et al., 2003). Articles appearing in the *Review of Higher Education* (RevHE) in this five-year period were even less concerned with research policy, with only two that examined the related topics of faculty work in research university settings (Fairweather & Beach, 2002; Slaughter et al., 2004). By not addressing research policy more overtly in our core journals, this topic will be defined at a distance from higher education scholarship, without being informed by our work on various related subjects such as faculty labor, student development, administration, finance, and institutional policy.

While scholarship concerning research policy is not prevalent within the field of higher education, research policy has been addressed by science policy scholars, who have approached the topic from distinct disciplinary perspectives that are necessarily focused away from higher education (e.g., Banchoff, 2002; Guston, 1997). Indeed, in the introduction to their special issue of *Higher Education* on universities and the production of knowledge, Bleiklie and Powell said that, "students of higher education systems and reforms seem to communicate little with students of knowledge production, research and science and technology" (Bleiklie & Powell, 2005, p. 1). Of course, the reverse is also true. As such, few scholars, whether they be from higher education or science studies, have attempted to make connections between the making of research policy and its implementation at the institutional level, which involves the distribution of research funds, research

administration, academic labor, and the education of undergraduate and graduate students. While science policy studies have provided some frameworks for understanding how policy affects academic work and culture in the sciences, “research” is a much broader activity. As such, research policy affects all disciplines and academic functions, particularly in research-intensive institutions.² In order to approach research policy from this broad perspective, an examination of the current state of research policy is first in order.

This work endeavors to provide a framework for the study of research policy from the perspective of the field of higher education, which considers institutional policies, as well as state, federal, and international policies. It requires contextualizing the study of research policy with an historical overview of the rise of academic research and its connections to the field of science policy studies. In addition, it is necessary to define the scope of research policy, which is done here through a typology that organizes the various strands of research policy into the thematic categories *mission*, *support*, *management*, and *translation*. Finally, to address this broad conceptualization of research policy, the macro-level theory of political economy is described as a way to approach the study of research policy, but with important re-conceptualizations recommended for the inclusion of meso- and micro- level intersections between politics and the economy.

Modernism, Academic Research, and Science Policy

Although higher education was founded much earlier in many parts of the world, including the areas that today constitute Turkey, China, India, and Egypt (Huff, 2003), before it appeared in Europe, Western academic research has been fundamentally shaped by the Christian monastic and philosophical traditions of Europe. In the Western world, research has always been a modern activity. By modern I mean both the period following the Late Medieval Age and into the early 20th century (modernity), and also the rationalization of Western society as aided by the forces of capitalism and industrialization (modernism). While we are now in the postmodern era, the foundation of the contemporary academy and thus the context of academic research originated in the social, political, and economic milieu of European modernism. The survival of the Scholastic system of lectures, named chairs, the academic procession (replete with regalia) and other quasi-theological ritualistic behaviors, despite “reforms” undertaken during the Enlightenment and other periods, complicates the notion of the modern academic enterprise (Clark, 2006),

²In this context, research is taken to mean any form of inquiry out of which a “knowledge product” is intended for public dissemination; research is usually peer-reviewed and communicated through proscribed channels (e.g., journals, books, patents, juried exhibitions, public performance).

but modern it is. Bloland (2005) defined modernism as “strongly held assumptions both in and out of academia regarding the core values of the Enlightenment: the centrality of reason, the belief in progress, the virtues of individualism, and faith in the scientific method” (p. 122). It is this progressive notion that has driven and continues to drive research policy today.

Scott (2006) reviewed 850 years of Western scholarly history and ascribed six major missions of the university during the first millennium. He argued that these missions have been overlapping and interdependent, but nonetheless chronological: teaching (1150–1500), nationalization (1500–1800), democratization (1800 to present), research (1800 to present), public service (late 1800s to present), and internationalization (21st century). In his detailed account of each phase and its historical context, Scott described the multiple missions as having regional and nationalistic characteristics that have cross-fertilized to create today’s academic institutions. According to Scott and others, research was first incorporated into the university mission in the 19th century, borne of an interest in state-building and bureaucratic efficiency. Since its modern inception, the act of seeking knowledge in an organized fashion has taken its place in the new *trivium* of teaching, research, and service that characterizes the contemporary academy.

In the scholarship of American higher education, the ascendancy of the Germanic model of academic research has been widely reported, but this body of literature has been recently described as empirically flawed and steeped in the “Humboldt Myth” (Ash, 2006). Humboldt (1767–1835), a Prussian scholar and bureaucrat, has been credited as founding the modern university and the notion that pure (as opposed to applied) science (*Wissenschaft*) could and should co-exist alongside a liberal education (*Bildung*). Ash stated that recent studies “suggest that the narrow linkage of ‘the’ German research university model to the name and ideas of Wilhelm von Humboldt is a myth, a tradition invented around 1900 for reasons specific to the situation of the German university at that time” (p. 247). The Humboldt Myth, as outlined by Ash, purports that Humboldt forwarded a set of ideas that became the foundation of the modern research university in the United States: freedom of teaching and learning, the unity of teaching and research, the unity of science and scholarship, and the primacy of “pure” science over specialized professional training (Ash, 2006, p. 246). Ash noted that many of these concepts pre-dated Humboldt, and several were entrenched in the American academic system from an early age, as imports from other European higher education systems. Due to transnational flows in graduate training and the academic labor market, it may be impossible to trace for certain the origins of these concepts.

Indeed, writing many decades after Humboldt, Weber (1958) felt that the exchange between the German and American higher education systems flowed in the opposite direction. In describing the phenomenon of the state-sponsored academic/entrepreneur, he stated,

Of late we can observe distinctly that the German universities in the broad fields of science develop in the direction of the American system. The large institutes of medicine or natural science are ‘state capitalist’ enterprises, which cannot be managed without very considerable funds. Here we encounter the same condition that is found wherever capitalist enterprise comes into operation: the ‘separation of the worker from his means of production.’

The worker, that is, the assistant, is dependent upon the implements that the state puts at his disposal; hence he is just as dependent upon the head of the institute as is the employee in a factory upon the management. For, subjectively, and in good faith, the director believes that this institute is 'his,' and he manages its affairs. Thus the assistant's position is often as precarious as that of any 'quasi-proletarian' existence and just as precarious as the position of the assistant in the American university (p. 131).

In this way Weber situated the process of academic research within the production politics of modern society, which had been particularly shaped by American capitalism. Academic researchers and knowledge workers, as "quasi-proletariats," labored under the conditions set by their manager/directors, replicating the relationships between factory foremen and line workers of the industrial system.

The early years of the American research enterprise are chronicled and critiqued by Barrow in *Universities and the Capitalist State: Corporate Liberalism and the Reconstruction of American Higher Education, 1894–1928* (1990). Barrow noted that the rise of the American research university coincided with industrialization, and followed the same patterns of institutional change: "concentration of the means of mental production, centralization and bureaucratization of administrative control, the construction of national academic markets, and the rationalization of market relations between competing institutions" (p. 31). Throughout the industrial era, newly minted corporate elites looked to higher education institutions to supply the ranks of the professional-managerial class, with corporate foundations rewarding the more successful (efficient) degree providers. Furthermore, modernism's managerialist values of bureaucracy, hierarchy and the division of labor (Morrison, 2006), took hold in the American research university (Rhoades, 1998).

While American higher education was being influenced by the political economy of the post-agricultural era, the sciences were organizing around an alternative set of values. Particularly influential were the writings of Robert K. Merton (1942), who codified the norms of communalism, universalism, disinterestedness, and organized skepticism. These Mertonian norms laid the foundation of the independent academic peer review system and led to the formation of the era known as the Republic of Science (Polanyi, 1962), wherein it was felt that discovery was most likely when scientists were free from government intervention. Mertonian norms also influenced the structure of America's post-war and cold war science policy, with its emphasis on basic research (Calvert, 2006). Yet, despite Mertonian norms, peer review, and the Republic of Science, academic research in the United States was significantly marked by the progressive and capitalist tendencies of the state. By this time, universities had become sites of research and development (R&D) that served both the public good and the industrial sector by undertaking the time-consuming and costly pursuit of "basic" (and "applied") science, which were then adopted by the private sector for further development into new products or commercial techniques. In addition, by the end of World War II, research universities had become inextricably tied to the state through the pursuit of science for military purposes, and later for national economic development (Geiger, 2004; Leslie, 1993; Lowen, 1997; Slaughter & Rhoades, 2005).

The so-called "military-industrial complex" that characterized the American post-war political economy was embodied in the life work of Vannevar Bush, engineer

and early proponent of US science policy. During World War II, Bush headed the Office of Scientific Research and Development (OSRD), a government agency dedicated to the war effort. Through the OSRD, federal funding was directed toward specific areas of scientific research, such as nuclear energy, with wartime applications and significant social implications. Near the end of the war, scientists and university presidents called for the creation of a national research council, which would be led by scientists and distribute funding to basic research (Stokes, 1997). Bush was commissioned by President Roosevelt in 1944 with the task of answering the following questions in the consultation phase of the formulation of such a research council:

1. What can be done, consistent with military security, and with the prior approval of military authorities, to make known to the world as soon as possible the contributions that have been made during our war effort to scientific knowledge?
2. With particular reference to the war of science against disease, what can be done now to organize a program for continuing in the future the work which has been done in medicine and related sciences?
3. What can the Government do now and in the future to aid research activities by public and private organizations?
4. Can an effective program be proposed for discovering and developing scientific talent in American youth so that the continuing future of scientific research in this country may be assured on a level comparable to what has been done during the war? (Bush, 1945, p. 231).

In his 1945 report titled, “Science: The Endless Frontier,” Bush verbalized the “social contract” between science, government, and society. He declared that “scientific progress is essential” (Bush, 1945, p. 231), and that without it, “no amount of achievement in other directions can insure our health, prosperity, and security as a nation in the modern world” (p. 233). Moreover, he stated that “science is a proper concern of Government” (p. 233), which located science policy within the federal portfolio, yet he noted that “we have no national policy for science” (p. 234). Bush continued by outlining the role and conditions of academic science, which he discussed under the heading “Freedom of Inquiry Must Be Preserved”:

The publicly and privately supported colleges, universities, and research institutes are the centers of basic research. They are wellsprings of knowledge and understanding. As long as they are vigorous and healthy and their scientists are free to pursue the truth wherever it may lead, there will be a flow of new scientific knowledge to those who can apply it to practical problems in Government, in industry, or elsewhere (p. 234).

Bush called for a retraction of the government-imposed restrictions on science that were necessary in wartime, replacing them with a policy structure that would encourage a “healthy competitive scientific spirit” (p. 235). He also noted that a national-level science policy and research council should not interfere with the actual process of knowledge production in the academy, stating, “Support of basic research in the public and private colleges, universities, and research institutes must leave the internal control of policy, personnel, and the method and scope of the research to the institutions themselves” (p. 255). In this way, Bush described a two-tiered research policy

environment that entailed a national-level policy arena that intersected with a local or institutional-level policy arena. However, the differing roles of institutions by type (college, university, Land Grant, etc.) was not mentioned, neither were the affects of higher education systems at the state level (e.g., governing boards and trustees) on academic science. As such, even in the early stages of research policy formulation, discrete knowledge about higher education as a social institution and as a system of institutions was not taken into consideration.

As removed from the extant literature on higher education as it was, the Bush report did call for an expansion of scientific education at the high school and post-secondary levels, with particular emphasis on higher education: "To enlarge the group of specially qualified men and women it is necessary to increase the number who go to college" (p. 249). Yet, he stated that, "It would be folly to set up a program under which research in the natural sciences and medicine was expanded at the cost of the social sciences, humanities, and other studies so essential to national well-being" (p. 246). Throughout this section of the report, Bush supported work being done to create the "GI Bill" (Serviceman's Readjustment Act of 1944, Public Law 346), which fostered postsecondary attainment by veterans, although enrollments were not limited to science programs (Serrow, 2004).

While the Bush document was meant to solidify the application of government resources for the development of science for the public good, in this 16,600 word document, "war" was used over 100 times. In parts of the report this is in reference to the "war on disease" as well as security-related discourses. Bush's report eventually resulted in the creation of the National Science Foundation (NSF), which alongside the newly formed Department of Defense and the business sector, would shape the processes and content of US science policy (Kleinman, 1994; Stokes, 1997). Although it did not lead to the creation of a national research council of the type he envisioned (Blanpied, 1998), Bush's "Science: The Endless Frontier" has had long-lasting effects on research policy. The Department of Defense (currently concerned with the "war on terror") the NSF, and the National Institutes of Health (still battling the "war on disease") are the primary contemporary funding councils for research. For the next 50 years and into the present, despite the autonomous values of the Republic of Science, American science policy would be linked to industrial needs, nation-building legislation, the federal budget cycle, and congressional earmarks and appropriations (Bromley, 2002; Carey, 1985; Slaughter & Rhoades, 1996; Tsang, 2002).

The legacy of Bush's science program and the post-war phase of the American research university have been chronicled with great detail by Geiger (2004). As seen through Geiger's work, research has been conflated with "science," so much so that other research-oriented disciplines have adopted the rule of science in name or method. Although Geiger does not critique the predominance of scientific discourse nor does he frame his account of the American research university within epistemic paradigms, one can discern an emerging challenge to academic modernism toward the end of his book. His description of the student protest movements and the Summer of 1968 suggest that the modernist views of progress and positivism were being confronted in academe at a very personal level, despite prevailing

research policy regimes and abundant federal research funding. This theme is taken up by Brint (2005), who described the demographic changes of the late 20th century as having an effect on the composition and direction of the American university. He stated that, “university life in an age of mass higher education has no longer a natural affinity for many of its goals previously set by a traditionally defined, cultivated minority” (p. 34). As universities became less like elite institutions and more like “multiversities” (Kerr, 1963), the values and conditions of research changed as well.

It is worth noting that despite massification and the changes Brint notes, a large percentage of contemporary federally funded research takes place in elite, private universities. However, it has been stated that community colleges and the vocational institutions might play an important role in the innovation cycle as sites of R&D (Moodie, 2006), although pressure to do so may create tensions between the economic and educational interests of the communities they serve (Levin, 2006).

Mode 2, Entrepreneurial Universities, and Research Policy

Daniel Bell’s (1973) *The Coming of the Post-Industrial Society* used social forecasting methods to predict changes in production and economic structures that would affect Western society at the end of modernism. This post-industrial age, according to Bell, would be marked by the creation of a service economy, the preeminence of the professional and technical class, the primacy of theoretical knowledge, the planning and control of technological growth, and the rise of a new intellectual technology (Bell, 1973: 14–33). Furthermore, Bell stated that a post-industrial age would be significant in the following ways:

1. It strengthens the role of science and cognitive values as a basic institutional necessity of the society;
2. By making decisions more technical, it brings the scientist or economist more directly into the political process;
3. By deepening existing tendencies toward the bureaucratization of intellectual work, it creates a set of strains for the traditional definitions of intellectual pursuits and values;
4. By creating and extending a technical intelligentsia, it raises crucial questions about the relation of the technical to the literary intellectual (p. 43).

Many of these statements are now at the core of the debate over the intended and unintended outcomes of strengthening ties between the academy and industry and the academic research mission (Kerr, 1963; Readings, 1996; White & Hauck, 2000). In addition, these hallmarks of the end of industrialization echo the statements of higher education scholars who have chronicled the advent of the postmodern university (Bloland, 1989, 1995; Brint, 2005; Rip, 2004; Scott, 2006).

Castells (2000) built upon Bell’s notion of a post-industrial or “new” global economy by defining its properties and processes. He outlined five fundamental

features of a new economy: sources of production that are increasingly dependent on the high-tech sector; the shift from the production of material goods to information processing; a move toward flexible production and horizontally networked organizations; globalization of production and markets; and the transformative effects of new technologies (Castells, 2000). He noted that the transition to a new economy is not achieved equally throughout the world; developing societies become the labor-force for transnational conglomerates. This results in a stratification of the allocation of the benefits of the new economy's structures and production methods. He also noted the role of international financial institutions in global transactions and discussed the intersection between markets, governments, and global finance (p. 135). Flexible production methods, including a part-time or temporary labor force, allow organizations to meet changing cycles of innovation and demand. Yet, as workers become less tied to organizations through long-term employment, pension plans, unions, and health-care benefits, they become easily expendable. Castells (2000) noted that "never was labor more central to the process of value-making. But never were the workers (regardless of their skills) more vulnerable to the organization, since they had become lean individuals, farmed out in a flexible network whose whereabouts were unknown to the network itself" (p. 302).

Following Castells, it can be argued that the core values of the organization in the New Economy (flexibility, innovation, risk) must also be adopted by the knowledge worker, who otherwise would be without worth or work in the contemporary labor market. Ozga (2007) has noted that the Knowledge Economy appears "as a meta-narrative that assumes the commodification of knowledge in a global system of production and competition" (p. 65), which would have an impact on the location (globalization) and purpose of research (commercialization). In the academic research context, faculty and students are seen as knowledge workers subject to performance evaluations, external funding quotas, and limited-term employment contracts. By disrupting the traditional division of labor and diversifying the methods of production (and consumption), the so-called New Economy has ushered academic research into a postmodern phase.

According to the Mertonian value system, scientists should operate independently from the economy. Yet, a new value system, driven by a growing demand for high technologies and encouraged by national competitiveness policies, has emerged. Perry (2006) noted the growing conflict between the values *of* and *for* science, calling it a "value paradox" in the academy. In other words, while Mertonian science values "knowledge for knowledge's sake," science is seen by society as a source of innovation to solve problems or generate revenue. As such, while traditional norms would hold that science is *disinterested* in the marketplace, the contemporary marketplace is certainly *interested* in science. In the globalized economy, research policy then becomes not only in a nation's best interest, it is now also implicated in the global cycle of knowledge production.

Gibbons et al. (1994) illustrated the changing nature of research in recent decades. They deemed as "Mode 1" that knowledge associated with the traditional Mertonian norms of science, explored in a disciplinary-based academic context

with hierarchical structures, and relevant to groups of professionals or scientists (p. 3). In contrast, "Mode 2" knowledge is application-based, can be explored in an interdisciplinary fashion, and is by nature reflexive and socially embedded. Gibbons et al. attributed the "fuzzy boundaries" between scientific disciplines in academe to a shift toward Mode 2 knowledge production (p. 147). They further stated that disciplinary boundaries are not important outside of the university, yet may be necessary to develop the careers of scientists who would work in a cooperative setting. As such, they predicted that the emergence of Mode 2 production would not eclipse Mode 1 methods entirely. However, they also suggest that in a resource-seeking environment, Mode 2 would likely be more attractive to outside funding agencies and investors due to its application-based principles.

Delanty (2001) agreed with Gibbons et al. regarding the formation of a new production of knowledge, but did not believe that Mode 2 science would lead to increased social accountability. Delanty stated that rather than being held to social values, Mode 2 knowledge would respond to market values (p. 112). Delanty noted,

It is important to see the new discourse of accountability as part of a move toward market values. Ostensibly, accountability strengthens democracy, but it is close to the values of the market in so far as it has provided legitimacy for privileging certain kinds of knowledge over others. In reality, accountability is another kind of accounting. The blurring of the boundaries between science and society is better described as a blurring of the boundaries between science and the market (p. 113).

Delanty also saw the forces of globalization and academic capitalism (Slaughter & Leslie, 1997) as having an impact on knowledge production and the permeability of universities. He noted that in this context of market-relevant knowledge production, a new form of science has emerged, termed technoscience (p. 122). Biotechnology and communications technology, for example, are technosciences, innovations that cross the boundaries between applied and theoretical science. Delanty argued that Mode 2 knowledge production would not push research outside of the university, but rather that applied science and the facilities for training researchers would make university-industry relations stronger. Delanty stated that "in a knowledge-based global economy the high level of training that is to be found in the university provides a crucial site for the global expansion of capitalism" (p. 123).

In the United States, the Bayh-Dole Act of 1980 and related intellectual property legislation have profoundly affected the commercial potential of government-sponsored research (Mowery et al., 2001). Since industry and government had been involved in academic research projects prior to the 1980s, and several "mission agencies" of the US government had already granted permission for academic patent-holders to commercialize sponsored research, in many ways the blanket permission for technology transfer provided by the Bayh-Dole Act was a symbolic step toward a new "social contract" between university science and society. The previous "social contract," as described by Gibbons (1999), had

been based traditionally on the understanding that universities will provide research and teaching in return for public funding and a relatively high degree of institutional autonomy; under this contract, the universities, often supported through research-funding agencies,

have been expected to generate fundamental knowledge for society, and to train the highly qualified manpower required by an advanced industrial society (p. 11).

Gibbons further noted that a “social contract” also existed between industrial research and society and government research and society, but that in the current era these boundaries have been blurred due to post-war economic needs and social change. He stated, “A new contract will be based upon joint production of knowledge by society and science” (p. 17).

Since the 1980s, the “entrepreneurial university” has been the subject of numerous books and articles (Clark, 1998; Davies, 2001; Etzkowitz, 1983; Fairweather, 1988; Louis et al., 1989; Michael & Holdaway, 1992; Rhoades & Smart, 1996; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004; White & Hauck, 2000). Stankiewicz (1986), in *Academics and Entrepreneurs: Developing University-Industry Relations*, stated that “it is felt that universities could contribute to the revitalization of national economies by assisting small and medium enterprises as well as by generating entirely new high-technology businesses” (p. 2). Academic interest in this notion, he stated, is partly attributable to the “increasingly uncomfortable budgetary constraints imposed on universities by hard pressed governments” (p. 2). While budget crises at the state level may be to blame for the retraction of block grants and appropriations to institutions of higher education, a more macro-level political economy perspective holds that resource stress is only part of the issue. Slaughter and Leslie (1997), in *Academic Capitalism: Politics, Policies, and the Entrepreneurial University* stated that changes in higher education policies

are, for the most part, geared toward increasing national economic competitiveness; they are concerned with product and process innovation, channeling students and resources into well-funded curricula that meet the needs of a global marketplace, preparing more students for the post-industrial workplace at lower costs, and managing faculty and institutional work more effectively and efficiently (p. 63).

Indeed, the theory of academic capitalism holds that universities as organizations and academics as individuals actively engage in the formation of new social networks and ties with the private sector, which transforms the “public good model of research” into an “academic capitalism research regime” (Slaughter & Rhoades, 2004, p. 76–77). Slaughter and Rhoades (2004) note that a range of federal policies permit a closer relationship between the market, state, and higher education, many of which would not be called “science policy” per se but can be considered “research policy.” These policies are influenced by both academics and politicians, and they reinforce the values of the academic capitalism research regime through increasing competition in the public sphere and strengthening intellectual property rights for commercialization. For example, the Digital Millennium Copyright Act of 1998, the Next Generation Internet Research Act of 1998, and the Technology, Education and Copyright Harmonization (TEACH) Act of 2002 each facilitates the commodification of the “products” of academic labor (scholarship, performances, and teaching materials—particularly when in electronic form) and permit “technology transfer” to include a wider range of knowledge outputs, far beyond those generated in the sciences. Furthermore, these federal-level policies influence the development

of institutional policies and administrative functions, as colleges and universities are called upon to police copyright infringement and the legal transfer of rights and royalties.

The intensified resource-seeking orientation of higher education at the expense of the “public good” was also discussed by Pusser and Doane (2001) in “Public Purpose and Private Enterprise: The Contemporary Organization of Postsecondary Education.” The authors commented on organizational adaptation in the higher education sector by stating,

Just as one is unlikely to find a perfectly competitive market for the provision of higher education, one also would have trouble finding a nonprofit college or university entirely engaged in producing public goods. The growth of auxiliary enterprises, industry-university research partnerships, for-profit subsidiaries of nonprofit institutions, and entrepreneurial continuing-education programs are just a few examples of an increasingly commercial orientation of nonprofits, and a conversion of nonprofit and for-profit institutional forms and behaviors (p. 19).

Pusser and Doane challenged the notion that nonprofits act solely in the public interest, and closed with the speculation that the winner in the battle between for-profit and nonprofit higher education is not to be taken for granted, as “it may turn out that Godzilla is a nonprofit” (p. 22). In this way, it cannot be assumed that public higher education is solely focused on the public good, nor should we assume that research policies that rely upon public funding are not in the end supporting private gain.

Several new books were published in recent years on the commercialized nature of higher education (e.g., Bok, 2003; Gould, 2003; Kirp, 2003; Tighe, 2003). Each of these works speaks not only of the entrepreneurial focus of university research, but also of recent market approaches to student enrollments, instruction, and public service functions of academia. Kirp reminds us in the first chapter of his *Shakespeare, Einstein, and the Bottom Line: The Marketing of Higher Education* not to romanticize academe, as the history of higher education has been tied to notions of utility since the Morrill Act of 1862. But he stated that “what *is* new, and troubling, is the raw power that money directly exerts over so many aspects of higher education...the American university has been busily reinventing itself in response to intensified competitive pressures” (p. 3–4). Kirp continued this thought by stating that “entrepreneurial ambition, which used to be regarded in academe as a necessary evil, has become a virtue.” After comparing the rise of for-profit universities with the various revenue-generating instructional ventures of public and private institutions, Kirp concluded that the support of scholarly communities is not a primary concern of the marketplace, and therefore profit seeking conflicts with the social role of higher education. This process may have significant implications for research policy if the market replaces peer-review and economic concerns become the primary criteria for adjudicating grants and assessing research performance.

The process of corporatizing the university was described by Gould (2003) in *The University in a Corporate Culture*. He reflected that the four main goals of American higher education in the early 20th century had been the provision of liberal education, the disciplinary pursuit of research and scholarship, the support of the economy through utility and useful knowledge, and service to society (p. 2). Gould later stated that the corporatization of higher education includes

quality management criteria and strategies drawn from the world of business; an emphasis on marketing, visibility, and public image promotion; accounting concerns for contribution margins and the perennial cost effectiveness of learning; decentralized power structures with incentives for growth and gain-share revenues; the redistribution of labor—in this case away from tenured to part-time and adjunct faculty; the development of sophisticated ancillary products, patents, and services; a vague rhetoric of excellence that replaces specific details of what an education is about, and of course, research and other financial collaborations with the corporate world (p. 31).

Although Gould acknowledges some of the benefits that have come from corporate philanthropy, his central tenet is that liberal and democratic education has been eroded by corporatizing effects. Research policy, then, might be considered in relation to either the erosion of liberal and democratic education or its increasing legitimacy as a key university response to external pressures to produce more research that is “market-relevant.” In other words, research policy can be situated in the marketization discourse as a change agent either supporting traditional structures and values or newer ones.

Bok (2003) was more conciliatory than Gould in his tone in *Universities in the Marketplace: The Commercialization of Higher Education*, stating, “the ways of the marketplace are neither consistently useful nor wholly irrelevant in trying to improve the performance of research universities” (p. 32). The way to balance the needs of intellectual freedom and market value, according to Bok, is to institute a policy of opportunistic relativism. In other words, each revenue-generating proposal should be individually evaluated according to its own merits and limitations. While this diplomatic and entrepreneurial prescription is not surprising from a former president of Harvard, it may be a bitter pill for many public college and university administrators facing pandemic “mission creep”: the charge to serve more students while striving to produce “world class” research. Policies of opportunistic relativism will likely pit the undergraduate teaching mission against those functions of higher education, such as research, that generate the highest revenue.

Thus, the policy environment for teaching and research in higher education has become more complex and market-oriented. Were we to examine the research function of academe and its policy landscape from solely the point of view of science policy, we would not be able to account for the non-sciences nor would we notice the impact of research activities on the overall mission of higher education institutions. Rather, “research policy” is a more inclusive term that would permit the consideration of these broader policy arenas. Furthermore, the research traditions of higher education scholarship would bring a more holistic conceptualization of research activity and the various people, practices, institutions, and systems that are affected by it.

What Is Research Policy?

Federal-level higher education policy, particularly in the United States, is largely concerned with the funding and governance of postsecondary education systems and institutions; in other words, affordability, access, and accountability (Heller, 2003), with a particular emphasis on student financial aid policies. At the regional

level, higher education policies affect accreditation, inter-institutional recognition of degree programs and transfer course credits, collaborative research networks, and regional development. At the state level, higher education policy may also be focused on regional or local economic development, workforce or skills preparation, community development, and other aspects of social and economic welfare. At the institutional level, higher education policies are both formalized and informal and pertain to education, management and support of institutions.

When it concerns the training and credentialing of scientists and those working in science fields, higher education policy can also be seen as a form of science policy. One example is a targeted student financial aid policy aimed at increasing the number of students who earn science-related degrees. In North America, higher education policies are generally made at the level of federal governments, provincial/state governments, and institutions. Internationally, higher education policies pertain to student exchanges and transfer of credits, memoranda of agreement concerning research collaboration, and the provision of educational products and services issues where regional trade treaties are involved, such as the North American Free Trade Agreement (Barrow et al., 2003; Enders, 2004).

In contrast, science policy largely describes the set of policies that govern not only academic science but also national laboratories, independent scientists, industrial science, and international cooperatives beyond university consortia. Examples of science policies include but are not limited to those aimed at intellectual property management (patenting, licensing, copyright), telecommunications infrastructure, the regulation of food systems, the use and protection of natural resources, medical and pharmacological experimentation, environmental/resource conservation, and energy production. These policies are made at all levels (international, federal, provincial/state, municipal, and institutional).

Research policy emerges at the intersection of higher education policy and science policy, and extends slightly beyond each. While research policy includes the funding and regulatory mechanisms for scientific research (both inside and outside academe) that are within the domain of science policy, it also considers research support for the arts, social sciences, and humanities and the wider context of intellectual property policy, especially as an impetus for innovation. Research policy may also address the support of research that happens outside the academic environment, such as arts council funding that goes to an art historian employed at a museum. In addition, research policy also is concerned with industrial research and development (R&D), particularly as that relates to national innovation systems and international competitiveness. Research policy also has several tiers, including international, federal, provincial/state, municipal, and institutional.

Types of Research Policy

To date, none have attempted to create a typology of research policy. In Table 1, I offer a method for categorizing research policy under the headings of mission,

Table 1 A typology of research policy

Research Policy			
Mission	Support	Management	Translation
Innovation systems	Funding	Ethics	Patenting and licensing
National competitiveness	Collaboration and network formation	Conflict of interest and consulting	Spin-offs and incubation
Science and technology	Infrastructure and facilities	Intellectual property	Equity and royalties
Regional economic development	Students	Employment	Publishing and (non) disclosure
		Tenure and promotion	
		Research evaluation	

support, management, and translation. The table and the categories present recent scholarship that both examines particular policy types but also is general enough that as a whole the section serves as introduction to the field of research policy studies. Wherever possible I have noted literature from higher education journals, but as noted earlier, much of this scholarship is located outside of the field. Moreover, much of the literature on research policy has been undertaken outside of the American higher education context. As such, there is a need for more research on the topic from the point of view of higher education scholars, particularly in the United States.

Mission Policies

Mission policies are expressions of intent or ideology regarding research that occur at the international, national, and regional levels. Often these policies do not explicitly refer to research, but indirectly refer to the conditions of research and the social values of inquiry.

Castellacci et al. (2005) offered an excellent but uncritical overview of the field of “innovation studies,” which attempts to understand the “innovation systems” of various governments and international consortia. They describe innovation studies as being influenced by the work of Schumpeter (1934), and having an interest in the “relationships among economic, technological, organizational, and institutional changes” (Castellacci et al., 2005, p. 91). The authors describe the historical-empirical approach and interactive learning-based approach to the study of national innovation systems. Innovation policies concern the integration of institutions for the development of “innovative” industries, and as such are often connected to information and communications technology (ICT) policies and university-industry relations initiatives. Innovation policies in these models assume a supportive State, as well as a favorable economy and a competitive market (Nelson & Winter, 1977). Academic research is an integral part of innovation policies, and universities are particularly noted in the literature on research “clusters.”

National competitiveness policies, which have similarities to innovation policies, also affect academic research. While innovation policies are directed to “new” areas of development that will likely have a positive impact on the economy, such as high-tech products, competitiveness policies are not narrowly defined on a particular industry sector. For some countries, like Canada with its large oil reserves and petroleum research programs, energy policies are national competitiveness policies. Slaughter and Rhoades (1996) produced what is still one of the more comprehensive articles on American competitiveness policies and their effects on academic research, which they recently reprised and updated (Slaughter & Rhoades, 2004). US national competitiveness policies are post-cold war incentives to adapt the military-industrial research complex into a research and development (R&D) complex that serves the American economy as well as national defense. Slaughter and Rhoades listed 27 separate pieces of federal legislation from 1970 to 2002 that can be regarded as competitive R&D policies, including the Plant Variety Protection Act, Bayh-Dole Act, Orphan Drug Act, and the Digital Millennium Copyright Act.

Science and technology policies are general statements about the role of science and technology in a particular society, usually from a nationalist standpoint (Kraemer, 2006). These policies are very similar to innovation systems policies and can also be seen as national competitiveness policies depending on the economic proclivity of the national context. In the United States these policy statements are often legacies of Vannevar Bush’s (1945) work, such as a National Science and Technology Council document with a section titled, “Science: the Endless Resource” (Clinton & Gore, 1994). Science and Technology policies are informed by a variety of policy actors, as noted by Slaughter and Rhoades in their 2005 examination of US policy in the 1990s.

Regional economic development policies are relatively straightforward in that they aim to increase the value of capital in a particular region. A recent article by Geiger and Sa (2005) provides a good example of how to conceptualize regional economic development policies. In their study of state-level policies targeting “technology based economic development,” they examined several states involved in developing policies and policy-structures to capture the financial rewards of university-based research. They categorized the states’ initiatives as either “technology creation” or “facilitation” policies. Technology creation policies involved the formation of research networks and infrastructure for longer-term investment while facilitation policies enabled more rapid technology transfer for immediate returns. As they pertain to higher education, regional economic development policies involve state, provincial, or regional efforts to maximize the financial returns to academic research.

Support Policies

The second category of the typology presents a broad range of support policies. These policies enable academic research to happen through funding, forming collaborative networks, building the necessary infrastructure and facilities, and by enabling students to be a part of the research process.

Although it is the most well-known aspect of research policy, research funding is not particularly well-examined in the literature. Research funding policies concern the provision of financial support for all aspects of research, from simple travel grants to multi-million dollar awards for extensive research programs. Leifner (2003) provided an example of a comparative study of higher education funding, which touches briefly on research grants and contracts. While the comparison of universities in different national systems is ambitious and somewhat uneven, Leifner's work is useful in its theoretical discussion of the effects of funding types on institutional behavior. Liefner noted that competitive and non-competitive resource allocation methods differentially affect the motivation of individuals and the quality and quantity of research produced. Payne (2003) produced a similar study that examined the effect of congressional ear-marks and set-asides on research productivity in the American university system, finding that the type of funding had a significant effect on quality and quantity of research. In both articles, quantity and quality of research was measured by publications, which should perhaps be augmented by other measures in future research.

Policies that promote collaborative research and network formation are increasing in number, and often have nationalist dimensions and strategies. Fisher et al. (2001) described in detail the creation of Canada's Networks of Centres of Excellence (NCE) program, historically situating the discussion of the NCE in the developments of national science and technology policy. The NCE are funded research units that are expected to collaborate and share knowledge across institutional and provincial boundaries, for the betterment of research and the national interest. Other forms of collaboration and network formation policies that are under-researched include international memoranda of agreement, faculty exchange procedures, telecommunications innovations (like Internet2), or other policies that enable researchers to communicate and share knowledge.

Infrastructure and facilities policies are very important aspects of research policy, but are largely under-studied. This set of policies is concerned with the physical support structures for research, such as laboratories, equipment, research centers, and overhead costs (Ehrenberg, 2000). Harmon (2000) compared the allocation of block funds for research infrastructure under the UK's Research Assessment Exercise system and Australia's Research Quantum program. Harmon's findings point to the difficulty in determining on a national scale how and where to distribute funding for research facilities, given the diversity of institutional types and disciplinary needs.

Student support is more widely studied than infrastructure, with attention paid to the quality of undergraduate and graduate student training for industrial needs, the conditions of labor of student researchers, and the co-location of teaching and research (Becker & Andrews, 2004; Brew, 1999; Jenkins, 2003; Neumann, 1992). In the case of students, support policies not only pertain to funding mechanisms (stipends, scholarships, and the like), but also to educational outcomes. Behrens and Gray (2001) situated the discussion of graduate student researchers in the context of cooperative research programs, which co-locate graduate student education with industrial research. They examined the impact of the source of funding (industry, government, or no sponsor) and type of funding (single source, consortial,

or un-funded) on several aspects of graduate student education. Their study shows that graduate student education is affected by larger science and technology policies at the national level. Rhoads and Rhoades (2005) also examined graduate students, but from the perspective of unionization and employment contracts. In their qualitative study, the employment of graduate students, both as teaching assistants and researchers, was examined in light of the “corporatizing” academy. They found that graduate students were increasingly drawn to unionization as an alternative to the subordinate positions in which they perceived themselves in the knowledge production process. The context of the article, the American higher education system, is in contrast with Bleiklie and Høstaker (2004), who discussed the effects of university reforms in England, Norway, and Sweden on graduate student training. Their comparative study demonstrated that each country was standardizing the academic career path through changes in the graduate student training process, focusing on the differences between teaching and research functions.

Management Policies

Of the four major types of research policies, those concerning research management are the most directly connected to the institutional level of policy making. In this category are policies for the ethical review of research, conflict of interest, work for hire, intellectual property, employment, tenure and promotion, and research evaluation.

The topic of research ethics and various associated policies appears in the literature most often in the medical sciences literature. Rarely is the topic addressed from the point of view of the university or research community as a whole. Scott (2004), however, approached the topic of academic ethics broadly, and in doing so has created a foundation for future studies of institutional review boards (IRBs) and their practices. He grounded the topic of research ethics by providing an overview of the historical value systems of the academy and the changing role of the university in society. This perspective is important, as the tendency has been to critique the minutiae of the research ethics process rather than to understand how the ethics of academic research is socially constructed and evolving.

Conflict of interest and consulting policies address the boundaries of employment and affiliation between individual researchers and their institutions. In many cases a tension exists as a result of efforts to increase the commercialization of academic research, where the traditional notions of academic freedom and disinterested science are at odds with entrepreneurial activity and the generation of market-relevant research. This tension can be seen readily in comparative research like that done by Goldfarb and Henrekson (2002), who juxtaposed the “top-down” academic commercialization policies of the Swedish government with the “bottom-up” approach of the US government. Although not critical of the governments’ efforts to increase academic commercialization, their study makes evident the linkages between individual academic freedoms and behaviors and national science and technology policy structures.

Intellectual property (IP) policies are widely studied in various fields, but not fully articulated as a subset of research policy. From a higher education standpoint, much of the literature on intellectual property has focused on the ownership of course materials, the use of copyrighted materials in the teaching and research functions, and the ownership rights of faculty researchers as the products of their academic labor are transferred to the market. Coriat and Orsi (2002) provided an overview of the American intellectual property policy arena, which is helpful in contextualizing the debate over IP in higher education institutions.

Employment policies that fall under the heading of research policy are those that affect the nature and process of research. In this sense, many institutional and higher-level policies that govern the types of individuals who might be hired at an institution (such as immigration policies) could be perceived as research policies. For example, Hall's (2005) work on "brain-drain" and "brain-gain" policies at the national level has direct bearing on institutional policies concerning faculty retention and research collaboration.

Tenure and promotion policies are related to employment policies but specific to faculty employees. These may be considered as research policies when they are linked directly to the research function of the academy. For example, if an institution grants tenure to research-only faculty, the conditions and criteria of those policies, and their impact on other forms of faculty employment, can be considered as research policy (Schuster and Finkelstein, 2006). The work of Sax et al. (2002) on the research productivity of women faculty can also be considered in this category due to its relevance to the topic of gender equity and research performance. Aper and Fry's (2003) work on post-tenure review is also related to research policy where post-tenure review is linked to faculty research productivity.

Finally, research evaluation policies are also part of the management strand of research policy. Formal research evaluation is most prevalent in a few national systems, such as the UK and Australia, hence much of this literature has been developed outside of the United States (Yokoyama, 2006).

Translation Policies

By far the most developed category of research policy studies is the set of policies that concern the translation of research from the academy to the larger social sphere. Translation refers to the movement of ideas from the academic sector to society, although as a policy construct the process is most often considered a movement from the public sphere to the private market. As a group these practices have been referred to as "technology transfer" policies, but their scope is broader than "technology" as it encompasses the whole of research dissemination from the academy. The policies in this category might therefore be better classified as "knowledge transfer," as defined by Ozga and Jones (2006), which de-emphasizes the commercial incentives for research translation. This category includes policies for patenting and licensing, spin-offs and incubation of companies, equity and royalties from academic research, publishing and (non) disclosure practices.

Research on the technology transfer process has been largely conducted in the field of science policy and management studies, although it is hard to think of a set of policies and practices that are more connected to the commercialization of academe. Indeed, as patenting is now considered in the tenure process in some institutions and as technology transfer activity is on the rise in North American universities, the scope of higher education research should be broadened to regard these activities in relation to the traditional core pursuits of the academy.

A preliminary search for the words “technology transfer” in the ISI Web of Science database showed that between 1980 and June 2006, over 3,300 academic articles contained the phrase, with the highest concentrations of articles appearing in journals such as the *International Journal of Technology Management* (109 articles), *Abstracts of Papers of the American Chemical Society* (87), *Technovation* (82), and *Research Policy* (71). By contrast, only 12 articles containing the phrase “technology transfer” appeared in higher education journals (*Higher Education* and the *Journal of Higher Education* containing 6 each), 2 of which were book reviews. In addition to the two articles by Powers mentioned at the start of this chapter (Powers, 2003, 2004), a few other higher education scholars have written on the topic (Dill, 1995; Owen-Smith & Powell, 2003; Rogers et al., 1999; Slaughter & Leslie, 1997; Slaughter & Rhoades, 2004), but the most consistent authors on the topic are Mowery and colleagues (Mowery et al., 2001, 2004; Mowery & Sampat, 2001a, b, 2004).

Spin-off or “spin-out” companies are those that are formed by academics based on work done under the aegis of academic research. At times these companies are “incubated” by university research centers, sometimes in university research parks. From a research policy perspective, the focus is on the legal creation of such companies and contractual arrangements for profit-sharing arrangements with their university hosts, and conflict-of-interest settlements between faculty, students, and staff who work at or own shares of the company. However, it is also possible to consider spin-off activity as part of the larger technology transfer policy structure, as done by Meyer (2006). He noted that in the case of Finnish higher education, there was a larger share of academic patents being licensed by established firms than by spin-off companies, which may have implications for the justification of spin-off activity as a method for greater commercialization of university patents.

Related to spin-off policies are those that support the creation of research parks for the purpose of incubating spin-off companies or those that are licensing university patents. These parks have been central to regional economic development strategies, and as such are often tied to mission-level research policies. An example of policy research that examines these multiple layers is that of Harper and Georghiou (2005), who examined regional development policies that called for the creation of the Manchester Science Park in the UK. The research park was created to develop the city of Manchester as a “Knowledge Capital” in the region, with university research as a core element.

When so much economic activity is happening at the periphery of the academic enterprise, policies must be created to monitor fiscal operations and those that are intended to provide incentives for commercialization. Geiger (2006) has identified some of these policies in an article detailing internal and external strategies of

research universities to ensure “economic relevance,” and Stein (2004) has edited a collection of essays that respond to the question of whether or not universities are “buying in or selling out.” The drive to economic relevance has raised new “quandaries” as the boundary between the university and the market is negotiated (Slaughter et al., 2004).

Research policies related to conflict-of-interest policies are those that specifically deal with remuneration in terms of equity holdings, royalties, and patents. Feldman et al. (2002) have explored the economic development strategy of permitting equity holdings, where a university is a shareholder in a company such as a spin-off entity or one that is based on the licensure of university patents. While equity policies provide incentives for commercialization of academic research, they also open doors for conflicts to arise between academic entrepreneurs, universities, and industrial partners. Another area of potential conflict is in the disclosure of research results, which has no direct economic benefit but can have an economic consequence if the results of empirical research do not favor commercial interests. The research on this topic is often particular to disciplines in the medical sciences, as industrially sponsored research is closely tied to marketable products such as pharmaceuticals. Policies that regulate the ability of industrial sponsors to require academic researchers to sign “non-disclosure agreements” or “research delays” are intended to support the peer-review process and limit the potential for conflict-of-interest problems or research liability (Blumenthal et al., 1996; Campbell et al., 2002).

This section has presented a typology of research policies and policy activities that are relevant to the academic research arena. These policies can be categorized under the headings of mission, support, management, and translation. Despite the range of research policies with relevance to research on higher education, few have been addressed in core higher education journals. As noted, some of this can be attributed to the historical and disciplinary evolution of the study of research policy, yet much of the oversight is due to the lack of attention in research on higher education to a key theoretical framework for understanding research policy, the study of political economy. Political economy is the theoretical frame most applicable to the understanding of research policy, as political economy is located at the boundary of economic markets and political action, both key drivers of the genesis and implementation of research policies.

Political Economy and Research Policy

Political economic approaches are not new to the field of higher education (Breneman et al., 2006; Ordorika, 2003) but the recent increase in academic commercialization warrants a reconsideration of this perspective. Morrow (2006) defined contemporary political economy as “an interdisciplinary social scientific approach that studies the interaction between democratic politics and market relations” (p. xx). Yet he noted the limitations of this approach and called for a *critical political economy* to examine “how, when, and with what consequences the use of market mechanisms or state power can be utilized in problematic ways to guide

public policies” (p. xx). Nevertheless, Morrow did not acknowledge that academic fields and disciplines such as economics and political science, where theories are developed, are also part of the political economy of higher education. Thus, when applied to higher education, a political economy approach can be a reflexive exercise that positions the academic researcher at the center of the political economy of academic research.

Higher education scholars are in a unique position to provide much-needed examinations of the social, economic, and political implications of research activity, research labor, knowledge production, and the intersections between academic research and external constituencies. Yet only recently have higher education scholars begun to develop the theoretical and methodological tools to understand the topic of research policy in colleges and universities. For example, Mendoza’s (2007) scholarship on graduate student socialization in high-tech fields is quite relevant to the topic of research policy studies, especially in relation to the support category of policies that concern the distribution of resources to graduate students engaged in research. However, this level of analysis does not situate this process within a larger political economy of knowledge production, even as it draws on academic capitalism theory and the work of Tierney and Rhoads (1993) on academic socialization. The discussion of graduate student socialization in fields with high levels of research funding could have been expanded by drawing upon the work of Rhoads and Rhoades (2005), who view graduate student labor as part of a neo-liberal, global knowledge production process.

At the core of understanding how research policies and activities are implicated in the global knowledge economy is the macro-level theoretical construct of political economy. Although higher education finance and the role of colleges and universities in economic development have been topics of higher education research, the connection between political economy and research policy has not been strongly made. In addition, political economic studies of academic labor have begun to emerge, which concern both academic production and faculty identity in the new economy. While scholars of academic labor have not explicitly addressed research policy, employment policies (including tenure and academic freedom) are connected to the conditions of research. Furthermore, political economic perspectives are useful in comparative and international higher education research and for scholarship into teaching and learning. While this approach has not yet been applied to the study of the teaching/research nexus, the linkages between global knowledge production, education, and research training are certainly important to explore.

Slaughter and Rhoades (2004) stated, “By and large, science and technology scholars discuss policy but not politics” (p. 46). In turn, recently a number of scholars have noted that higher education as a field is also disengaged from political analysis (McLendon, 2003; Ordorika, 2003; Pusser, 2003). Based on categorizations of science policy studies by Kleinman (1998) and Slaughter (1993) and a review of extant literature I find that research policy has been studied from the perspectives of economics and politics, but not usually from a critical position that considers the inter-relations between the two.

In order to better understand the diversity of political economy approaches in the higher education literature, I reviewed the abstracts of articles published between

2000 and 2006 that were indexed in the ISI Web of Science and contained both the phrases “higher education” and “political economy.” Twelve articles were found, which is not a great number considering the number of academic articles published in higher education over this period (Baird, 2006; Boon et al., 2005; Greener & Perriton, 2005; Hess et al., 2001; Morgan et al., 2001; Morley, 2005a; Ntshoe, 2003; Parascondola, 2005; Shumar, 2004; Slaughter, 2001; Thelin, 2000; Torres & Schugurensky, 2002). While this is not an exhaustive list of recent articles using a political economy approach in higher education due to the limitations of the search criteria and database, the set includes articles from a diverse group of journals and authors. The 12 articles were reviewed to evaluate the ways in which “political economy” was defined in leading journals and to determine if the articles contained any analysis of research policy. The results of this analysis show that very few authors attempt to define what they mean by political economy and only one article of the 12 discusses an aspect of research policy (technology transfer).

Table 2 presents an overview of the selected articles, including the date of publication, the authors, the title of the journals, and the objects of analysis in each study.

Table 2 Political economy and higher education journals, 2000–2006

Year	Author(s)	Journal title	Object(s) of analysis
2006	Baird	Review of Higher Education	State-sponsored pre-paid tuition plans
2005	Boon et al.	Journal of Law and Society	Institutional dimensions of professionalism in Law
2005	Greener and Perriton	Studies in Higher Education	E-learning
2005	Morley	Women’s Studies International Forum	Women in higher education
2005	Parascondola	Minnesota Review	Remedial education
2004	Shumar	Journal of Higher Education	Anthropological methods in higher education studies
2003	Ntshoe	International Journal of Educational Development	Access to higher education in developing countries
2002	Torres and Schugurensky	Higher Education	Globalization and Latin American higher education
2001	Hess et al.	Contemporary Pacific	Higher education outcomes in a Marshallese community in the US
2001	Morgan et al.	Policy Studies Journal	State support for higher education
2001	Slaughter	Higher Education	Theories for use in comparative higher education research
2000	Thelin	Journal of Higher Education	Title IX legislation

In *Theories of Political Economy*, Caporaso and Levine (1992) noted that “a main difficulty of political economy...lies in a tendency to gloss over the separateness of the two spheres of the economic and the political, absorbing one into the other” (p. 6). The articles in this sample reflect this difficulty, as the authors often failed to provide a definition of the term and did not use a distinct political or economic methodology. Rather, most of the authors used the term to describe the socio/political/economic milieu, such as Morley’s concerns about a vaguely defined “changing political economy” of higher education (Morley, 2005a, p. 210). A few of the articles presented the policy process as a political economy (Baird, 2006; Morgan et al., 2001; Thelin, 2000) but they did not specifically call upon political economic theories *per se*. Greener and Perriton (2005) and Slaughter (2001) provided the most comprehensive overviews of political economic approaches. However, Greener and Perriton stated that political economy has its “foundations in Marxist thought” (p. 69) without noting the early contributions of Adam Smith’s (1776/1991) *Wealth of Nations* or John Stuart Mill’s (1848/2004) *Principles of Political Economy*. Although their overview of the history of political economy was somewhat off the mark, their discussion of “Keynesian National States” and “Schumpeterian Post-nation States” in relation to e-learning was the most specific political economic approach utilized in the 12 articles.

Slaughter’s (2001) article was also specific in its discussion of political economy, noting that in relation to globalization, it can be characterized as “conservative, neo-liberal or post-Keynesian, and radical or post-Marxist” (p. 398–399). In comparing various theories and their suitability to comparative higher education research, Slaughter (2001) stated that

Using these new theoretical developments in political economy and political sociology theory to study comparatively knowledge/power regimes in higher education allows us to study many new problems facing higher education... (p. 405).

A political economic perspective may also be useful to “deconstruct and problematize the ‘object’ ” of our study (p. 391), to focus on what Slaughter called the “peripheral entrepreneurial activit[ies]” such as technology transfer that should be examined more carefully by higher education scholars because they, along with other research infrastructure expenses, account for more revenue than student financial aid and they highlight the differential impacts on higher education of government, corporate, and institutional investments (p. 392).

In summary, these 12 articles are not uniformly clear in their presentation of a political economic perspective in higher education research. A common definition of political economy used by higher education scholars did not emerge from the literature reviewed, although each employed a state-level analysis that focused on the intersections between government and the market. Perhaps most notably, research policy, although a key policy juncture between higher education, the State, and the market, is not included in discussions of higher education’s political economy. None of the articles addressed research policy exclusively, although Slaughter mentioned the process as worthy of further examination.

Interestingly, our ability to research and consider the topic of political economy as it relates to higher education policy has been shaped by the same political and

economic forces that have shaped knowledge production in the academy. Historic preferences for providing resources to the sciences that date to a post-war call for a national research council (Bush, 1945) have enabled the creation of citation indexes to measure the flow of ideas and knowledge from one scientist to another (Garfield, 1955). The desire to know the origins of a scientific idea was soon overshadowed by the legal need to track patent histories and secure technology transfer rights, which created a market for the Institute for Scientific Information (ISI), in the late 1950s (Cameron, 2005). At present the ISI Web of Science (which includes the social sciences and humanities as well, although the name retains the monolithic notion of “science”) is a world-leader in citation indexes, and is utilized as a measure of journal “impact” factor and individual faculty research productivity (Bence & Oppenheim, 2005; Zucker & Cantor, 2003). Thus, the technology now used to measure the impact of *all* scholarly activity was socially constructed towards the needs of the sciences. In this way, we can say that the values of the sciences are “embedded” within the ISI Web of Science, and are reinforced over time through use by academics, administrators, and scholarly publishing companies. Technologies such as these are not neutral—they are part of the political economy of knowledge production in higher education (Metcalfe, 2006).

Given the recent publication of Rhoads and Torres’s (2006) *The University, State, and Market: The Political Economy of Globalization in the Americas*, a book that highlights a political economy perspective, and a growing body of books addressing the intersection of politics and economics in higher education (Breneman et al., 2006; Geiger, 2004; Slaughter & Rhoades, 2004) it is worth noting that the field of higher education is informed by both books and articles, but their impact on scholarship may not be equal. Articles are given priority in the promotion and tenure process and articles are the primary “objects” of study in the ISI Web of Science citation index. It is likely that the scientific publishing process has had a transformative effect on other parts of the university and the publication practices of non-science disciplines. With its preference for short articles rather than full-length books, academic science (a highly rewarded sector of the academy) is potentially shaping both the technological interface of the ISI Web of Science and the increasing preference for articles as a measure of productivity. Over time, the preference for articles over books in the production process of academic scholarship may affect the quality and type of work done in higher education, as scholars adapt to shifting norms for publication. It is for this reason that as higher education researchers we should consider the use of a political economic framework, one that accounts for our own production practices and how we are influenced by the politics and economics of the academic enterprise.

Caporaso and Levine (1992) noted eight different types of approaches to political economy: classical, Marxian, neoclassical, Keynesian, economic, power-centered, state-centered, and justice-centered. Despite the diversity of approaches they discuss, they find that the separate spheres of politics and economics are not easily combined. They stated, “We argue that economics and politics differ not only in method or institutions (market, state), but also in terms of the objects and processes central to each” (Caporaso & Levine, 1992, p. 222). Their discomfort

with the integration of politics and economics does not bode well for the insertion of a third institutional sector (higher education) into the market/state relationship. However, the tension between academe, industry, and governments has been at the heart of higher education research for some time (Clark, 1983).

How then might we study research policy, a phenomenon that is both political and economic as well as occurring between the market, state, and higher education, from a political economic perspective? Furthermore, if we adopt a political economic model, how are complex relations between nation-states considered, as the academic research enterprise is influenced by international comparisons and competition? Marginson and Rhoades (2002) contend that “the world in which we now live takes us beyond the conceptual confines of current comparative higher education scholarship” (p. 282). Furthermore, it is the complexity of our present context that calls for higher education research to consider “mixed methods, multiple site case studies, data gathering from micro to macro levels, and a variety of analytical techniques linked to discrete levels and units of analysis” as recommended by Slaughter (2001, p. 390). However, the conceptual models and theoretical underpinnings of higher education scholarship are so rooted in notions of the state, markets, and academic governance that even the “critical political economy” approach put forward as an “alternative model of envisioning and organizing the mission of higher education and research” (Morrow 2006, p. xx) is still focused on these traditional governing sectors without considering the role of other actors in the environment. Research policy scholars will need to develop a theory of political economy that includes not only the state, market, and higher education, but also interorganizational and interpersonal dimensions.

At the interorganizational level of political economy, research policy scholars will need to consider the notions of “boundary work” found in science policy studies, as well as “intermediary organizations” and “interstitial units” from academic capitalism theory (Slaughter & Rhoades, 2004). These concepts offer useful ways to see the areas of intersection between governance bodies, particularly where attention is also turned to issues of economic and political power. In research fund allocation, governments are thought to be sufficiently removed from the research context that an intermediary body (granting agency or funding council) must be utilized as a go-between, with the assumption that the intermediary organization is more capable of interacting with the research community (Guston, 1996; 2000). Building upon the concept of “boundary objects” in science as described by Star and Griesemer (1989), Guston renamed the intermediary agency a “boundary organization” to better reflect the “boundary-work” that takes place in this juncture between science and politics. Guston noted three characteristics of boundary organizations:

1. they provide a space that legitimizes the creation and use of boundary objects and standard packages;
2. they involve the participation of both principals and agents, as well as specialized (or professionalized) mediators; and
3. they exist on the frontier of two relatively distinct social worlds with definite lines of responsibility and accountability to each (1999, p. 93).

The language Guston uses in his description of boundary organizations is decidedly drawn from science studies, where the terms “boundary objects” and “social worlds” are common parlance, and principal-agent theory is often utilized. The boundary between science and politics has long been a focus of science/technology/society (STS) studies, and has been marked by the work of Gieryn (1983), Star and Griesemer (1989), and Jasanoff (1990). Guston’s work contributed to the field to the extent that “boundary organizations” in science policy became the focus of a special issue of *Science and Public Policy* in 2003 (see Hellström & Jacob, 2003). Like Braun, Guston perceived the role of the boundary organization as having two parts: the relationship with the government and the relationship with researchers. These organizations serve as “brokers on the boundary” between research and politics (Fisher & Atkinson-Grosjean, 2002).

It will require more work to understand how this “iterated” version of principal-agent theory might function in a political economic perspective, taking into account the boundary between science and the economy as well as the divide between science and politics (Moe, 2005; Morris, 2003). Furthermore, these boundaries will have to be understood in the context of higher education, where research activity happens in the non-sciences as well as the sciences. This may be possible through the consideration of intermediating organizations from academic capitalism theory, which sees organizations such as the Business Higher Education Forum, the University-Industry-Government Research Roundtable, Internet2, Educause, and the League for Innovation in the Community College as sites of contact between industry, government, and academe (Slaughter & Rhoades, 2004). These and other organizations “allow representatives of public, nonprofit, and private institutions to work on concrete problems, often redrawing (but not erasing) the boundaries between public and private” sectors (Slaughter & Rhoades, 2004, p. 24). Many of these organizations are active in the policy process, advocating or lobbying for particular political action relevant to the knowledge production cycle (Metcalf, 2005).

At the interpersonal level, the concept of boundary-work is still relevant (Waterton, 2005), but a political economic perspective of research policy would consider the position of individuals relative to the politics and economics of knowledge production, and the relationships between individuals in the knowledge process. For example, the role of individuals is articulated in the concept of “boundary-spanning,” which has been applied to the research policy process and describes researchers as fostering relationships between policy arenas (Guston, 2001). The concept could also be explored in terms of the economic implications of academic research as it has had wide application in the business literature (Aldrich & Herker, 1977; Tushman & Scanlan, 1981).

As Slaughter noted, political economic approaches “do not deal at length with discourse and narrativity, key elements in understanding higher education,” (p. 405), and as such must be augmented with other conceptual frameworks such as feminism or critical race theories that situate individual experience and narrative within larger social, economic, and political structures. For example, the writings of Bergeron (2001) and Morley (2005b) on the intersections between feminism and the global knowledge society are useful to understand the political and economic

context of academic labor and the position of women in the academy. In addition, as research is affected by the international migration of faculty and students, the topic of inclusion and exclusion as it relates to immigration policy (Gradstein & Schiff, 2006) may be useful to understand the connections between marginalization and the political economy of academic knowledge production.

Conclusion

In conclusion, research policy is increasingly vital to higher education institutions as governments at all levels reconsider the role of higher education in a knowledge society and knowledge economy. However, the topic of research policy is rarely addressed in higher education research, particularly in the United States. Although the US is a leading country in terms of academic research and the translation of research to the marketplace, these activities are not widely commented upon in the core higher education journals in America (*Journal of Higher Education*, *Review of Higher Education*, and *Research in Higher Education*), journals that are also well-regarded internationally. By neglecting the topic of research policy in these and other publication outlets, higher education as a field has become distanced from a scholarly dialogue currently underway in other disciplines, one that has had and will continue to have profound implications for the structures, functions, and social context of higher education institutions.

Furthermore, to fully address the topic of research policy and its implications for the academy, higher education scholars will need to draw upon critical theoretical frameworks that allow for conceptualizations of the role of academic research in a global knowledge society (Gale, 2006). As research funding is one of the few direct linkages between federal governments and higher education institutions in many countries, especially in North America, research policy can be seen as a manifestation of nationalist intentions for higher education, as well as an incentive structure for economic productivity. At the state or local level, research policy is central to regional innovation systems, and directs research funds to both community colleges and universities for the dual purposes of R&D and workforce skills development. If sensitive to these meso-level and micro-level dimensions, a political economic perspective can provide a useful framework for studying the various ways that research policy is shaped by and affects higher education.

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Studying the Effectiveness of Programs and Initiatives in Higher Education Using the Regression-Discontinuity Design

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Introduction

The goal behind any successful program evaluation is to be able to compare a treatment group to a control group where both of these groups are *equivalent in all respects* except for the group assignment. In other words, if individuals in a treatment group are equivalent in all respects to individuals in a control group, and if the treatment proves to be effective, then this would suggest that the effect is due to the impact of the treatment program and not to differences between the those participants in the treatment group and those participants in the control group. Without establishing treatment and control groups that are equivalent in all respects, no claim can be made as to whether or not it is the treatment program itself that caused the effect.

However, in cases where it may not be possible to use a true random assignment to establish equivalent treatment and control groups, there are statistical methods that can be used which emulate a random experiment. In particular, the regression-discontinuity design (Thistlethwaite & Campbell, 1960; Trochim, 1984), can be used to evaluate the effectiveness of a treatment program by establishing treatment and control groups which are, on average, equivalent to each other with respect to both observed and unobserved factors except for the group assignment. The main advantage in using the regression-discontinuity design is that equivalent treatment and control groups can be established similar to what a random assignment would generate, but without actually using a random assignment process.

This chapter describes how the regression-discontinuity design can be used to make causal inferences when it may not be possible to establish treatment and control groups using a true random assignment. I begin by providing some details about cause-and-effect relationships. I then describe the general theory that guides the regression-discontinuity design and elaborate on the use of an assignment variable. I also address issues such as model specification, sample size considerations, including additional control variables, and selection bias. I then address some problems with the regression-discontinuity design which could bias the estimate of the treatment effect such as functional form specification, crossovers, program attrition, and other potential outside effects. The regression-discontinuity design is then illustrated in detail. Finally, I provide a summary of what researchers need to consider before using the regression-discontinuity design.

Cause-and-Effect Relationships

You may have heard the expression that “smoking causes cancer”. This expression suggests that there is some form of a cause-and-effect relationship between smoking and cancer. In other words, by engaging in the behavior of smoking, this causes the effect of cancer. However, such an expression does not necessarily describe an absolute and perfectly-determined cause-and-effect relationship. For instance, not everyone who smokes gets cancer because there are cases where participating in the cause (smoking) does not always perfectly determine the effect (cancer).

So what is meant by a “cause-and effect” relationship? And what does it really mean to say that “smoking causes cancer”? One way to think about the notion of causality is to consider the concept of *probabilistic causality*. Probabilistic causality implies that “causes raise the probabilities of their effects” (Eells, 1991, p. 1). Therefore, if someone participates in the cause (such as smoking) this raises the *probability* of the effect (getting cancer). Thus when we describe the notion of a cause-and-effect relationship between smoking and cancer, and make the statement that “smoking causes cancer”, we are really describing a situation where participating in a cause raises the likelihood of the effect happening.

Identifying cause-and-effect relationships occurs if three criteria can be met: (1) the cause and the effect must be related, (2) the cause must precede the effect, and (3) there are no other alternative explanations for the effect other than the cause (Shadish et al., 2002). Thus, before a cause-and-effect relationship can be established we must consider the impact that all *other relevant factors* may have on the effect. For example, consider the effect of the lack of exercise on the incidence of cancer. Suppose that some folks who smoke also tend not to get enough exercise. Then by making the statement that “smoking causes cancer”, how can we be sure that we are inferring that it is the impact of smoking that increases the risk of cancer, or is it really the impact of a lack of exercise that is also associated with smoking that increases the risk of getting cancer?

In order to establish a cause-and-effect relationship in an experimental setting, treatment and control groups have to be established which are, on average, equivalent to each other with respect to *all relevant observed and unobserved factors* where the only difference between the treatment and control group is the group assignment. If treatment and control groups can be established as being the same then all relevant factors which could have an impact on the effect are equivalent with respect to both the treatment and control groups and the only exception is the group assignment. This is where the phrase *ceteris paribus* comes into play. *Ceteris paribus* essentially implies that all other relevant factors that could impact the effect are equal (Wooldridge, 2002, 2003). Thus, if it can be established that there are no other relevant factors which could generate the effect other than the cause, and if the cause precedes the effect and is related to the effect, only then can a causal relationship be inferred.

One of the more common ways to establish equivalent treatment and control groups in an experimental setting is to assign participants to either group by using a random assignment process. A random assignment establishes treatment and control groups

that are based only on chance (Shadish et al., 2002). For instance, a random assignment process that could be used to establish equivalent treatment and control groups can be done by flipping a fair coin for each subject, where subjects who receive heads are assigned to the control group, and subjects who receive tails are assigned to the treatment group (or vice versa). By using such a random assignment process, this makes all relevant observed and unobserved factors equivalent between the two groups because the two groups are formed strictly by chance. In other words, a random assignment ensures that the only distinguishing factor between the treatment and control groups is the group assignment because a random assignment establishes treatment and control groups such that, on average, that there will be no observed or unobserved differences between those participants who are assigned to the treatment group and those participants who are assigned to the control group. Therefore, if the treatment and control groups are equivalent, then any difference in the outcome measure between the treatment group and the control group could be attributed to the effect of the program. If treatment and control groups are not established as being equal, then any difference in the outcome measure of interest could be due to the differences between the two groups and not to the effect of the treatment program.

However, with various programs and initiatives in higher education it may not be practical or even possible to use a random assignment to establish equivalent treatment and control groups (Leake & Lesik, 2007; Lesik, 2006, 2007). In some instances using a random assignment process to establish equivalent treatment and control groups can even pose an ethical dilemma if beneficial treatments are withheld from participants who may need them (Leake & Lesik, 2007; Lesik, 2006, 2007; Shadish et al., 2002). Also, for treatment programs that are designed for a particular target portion of the population, by using a random assignment process, individuals within the target portion of the population could be deprived of a potentially beneficial treatment, and individuals who may not be a part of this target portion of the population may have to partake in a treatment program that they may not even need (Leake & Lesik, 2007; Lesik, 2006, 2007; Shadish et al., 2002).

The Regression-Discontinuity Design

The regression-discontinuity design (Thistlethwaite & Campbell, 1960) can be an alternative to performing a true random experiment. In fact, given the right circumstances, the regression-discontinuity design can actually emulate a random experiment (Pettersson-Lidbom, 2003). The regression-discontinuity design relies on an exogenous assignment variable where all of the participants in the study are assigned to either the treatment group or control group by using only an assignment variable which has a known cutoff score that is established prior to when the treatment begins (Shadish et al., 2002). Then the actual assignment to either the treatment or control group can be done by using the cutoff score of this assignment variable, and subjects can be assigned to either the treatment or control group depending on where they place in relation to the cutoff score of the assignment variable (Leake & Lesik,

2007; Lesik, 2006; Lesik, 2007). For instance, participants who score above the cutoff score could be assigned to the treatment group, and participants who score below the cutoff score could be assigned to the control group (or vice versa).

The actual assignment variable that can be used in a regression-discontinuity design can represent many different scenarios. For instance, the assignment variable can be an arbitrary or random constant similar to what could be generated by using a random assignment (Reichardt et al., 1995; Shadish et al., 2002). The assignment variable can also be in the form of a pretest which is used to measure some level of academic achievement (Leake & Lesik, 2007 and Lesik 2007, Lesik, 2006; Shadish et al., 2002). By using such an assignment variable to measure prior academic achievement, high achieving subjects would not be required to partake in the treatment program in which there may be no perceived benefit, and low achieving subjects who may be able to benefit from the treatment program would be given the opportunity to participate (Leake & Lesik, 2007; Lesik, 2006; Lesik, 2007).

If an assignment variable with a known cutoff score can be established prior to when treatment begins, then those participants who score just below the cutoff will, on average, be similar to those participants who scored just above the cutoff score. Then, by looking at a very narrow window around the cutoff score, the decision to assign someone to either the treatment or control group is essentially what a random assignment would generate. Thus, the difference between someone who scores just below the cutoff score and someone who scores just above the cutoff score is similar to what a tie-breaking random experiment would generate at the cutoff score (Shadish et al., 2002, vanDerKlaauw, 2002).

The Basic Regression-Discontinuity Equation

A minimum of three variables must be included when using the regression-discontinuity design; the exogenous assignment variable, the binary treatment variable, and the outcome variable of interest (Cook & Campbell, 1979; Shadish et al., 2002; Trochim, 1984). Once the exogenous assignment variable is used to partition the sample into treatment and control groups, it becomes possible to isolate the treatment effect by applying a regression analysis that includes the treatment indicator and assignment variable as predictors in a multiple regression model as follows:

$$Y = \beta_0 + \beta_1 TREAT + \beta_2(CPS) + \varepsilon \quad (1)$$

where *TREAT* is the binary treatment indicator that is used to describe the presence or absence of the treatment assignment, *CPS = Assignment Score – Cutoff* is the score received on the assignment variable centered at the cutoff score, and *Y* is the outcome measure of interest. The reason that the assignment variable is centered at the cutoff score is because at the cutoff score, the treatment and control groups are the most similar. In other words, those subjects who scored just a bit below the cutoff score should be similar, on average, to those subjects who scored just a bit above the

cutoff score. In a sharp regression-discontinuity design where there is 100% compliance with the assignment to either the treatment or control groups based on the assignment variable, adding the centered assignment variable to the regression equation completely models the selection process. Therefore, by including the centered assignment variable as a covariate in a multiple regression model along the treatment indicator makes the treatment indicator orthogonal to any possible observed or unobserved confounding variable (Berk & DeLeeuw, 1999; Berk & Rauma, 1983). Because the treatment indicator is orthogonal to any other observed or unobserved factor, this provides the opportunity to obtain an unbiased estimate of the treatment effect. In a sharp regression-discontinuity design where there is perfect compliance to the required assignment, the estimate of the treatment effect, $\hat{\beta}_1$, can represent an unbiased estimate of the causal effect of the assignment to the treatment program on the desired outcome measure.

Although many empirical studies using the regression-discontinuity design consist of an outcome variable that is continuous where ordinary least squares is the modeling strategy of choice (e.g. Leake & Lesik, 2007), the regression-discontinuity design can easily be incorporated with just about any type of regression analysis such as logistic regression (e.g. Berk & DeLeeuw, 1999; Berk & Rauma, 1983; Lesik, 2006), or discrete-time hazard modeling (e.g. Lesik, 2007).

Model Specification

The regression-discontinuity design relies on the correct specification of the functional form of the regression model with respect to the relationship between the assignment variable and the outcome variable. Although some exploratory techniques can be used to determine if there are gross misspecifications, such techniques can only be used for specific types of regression models such as ordinary least squares (Leake & Lesik, 2007) or logistic regression (Lesik, 2006).

It may be possible to avoid correctly specifying the functional form of the relationship between the assignment and outcome variable by including a sufficient number of observations within a very narrow range on both sides of the cutoff score, preferably at the cutoff score itself (Hoxby, 2000). However, it is often the case when there are not enough observations within a very narrow interval around the cutoff score to ensure adequate power. Therefore, it may be necessary to increase the size of the interval around the cutoff score in order to generate a larger sample, but doing so may introduce bias in the estimate of the treatment effect (Leuven et al., 2004; Pettersson-Lidbom, 2003).

As with any type of regression analysis, quite often it can be very difficult to accurately model the relationship between the assignment predictor and the outcome variable. This can be especially troublesome for the regression-discontinuity design because there are usually not enough observations within a very narrow range around the cutoff score to achieve adequate power. To help eliminate functional form specification bias, one strategy is to shrink the window around the

cutoff score and create discontinuity samples (e.g. Leuven et al., 2004; Pettersson-Lidbom, 2003) so that the appropriate functional form between the assignment variable and outcome variable can be determined. One such technique is to obtain an “x-point” discontinuity sample (Leuven et al., 2004; Pettersson-Lidbom, 2003) which can be found by first graphing the relationship between the assignment predictor and outcome variable for the entire set of data and then gradually decreasing the width of data collected around the cutoff score until the appropriate functional form can be determined. Then if the functional form of the relationship between the assignment predictor and the outcome variable can be modeled appropriately, this would also approximate a tie-breaking random experiment at the cutoff score (vanDerKlaauw, 2002). When it is necessary to include more observations above and below the cutoff score, a continuous assignment variable would be preferred because a continuous variable would maximize the chance of correctly modeling the functional relationship (Shadish et al., 2002)

Depending on the type of regression modeling that is being considered, one strategy to estimate the specification of the functional form of the relationship between the assignment and outcome variable is to conduct some exploratory graphical analyses. One technique is to use smoothing methods to graph the relationship between the assignment variable and the outcome variable for a given sample (Lesik, 2006; Lesik, 2007). Smoothing methods can be an effective way to empirically estimate the functional form of an ordinary least squares or logistic regression regression-discontinuity analysis because smoothing methods make the relatively weak assumption that the functional form of the relationship between the assignment predictor and outcome variable can be represented by a smooth curve (Simonoff, 1997).

One smoother in particular, the *lowess smoother* (locally weighted scatter-plot smoother), can be used for regression-discontinuity designs that use either ordinary least squares or logistic regression analysis (Hosmer & Lemeshow, 2000). For instance, lowess smoothers can be used to determine if the relationship between a continuous outcome measure and a continuous assignment variable is linear as in the case with ordinary least squares regression, or to assess the relationship between a binary outcome measure and a continuous assignment variable as is the case with logistic regression (Hosmer & Lemeshow, 2000). Lowess smoothers can then be plotted in such a way to examine the functional relationship between the outcome variable and the assignment variable (Lesik, 2006; Lesik, 2007).

For regression-discontinuity designs that may use regression models other than ordinary least squares or logistic regression analysis, it may not be possible to graphically check the functional form of the regression-discontinuity model (for instance if Poisson or Multinomial logit regression models are being used). One strategy that could be used with these other regression strategies is to add higher order powers of the assignment variable and interaction terms of the assignment variable and treatment indicator to the regression-discontinuity model. For instance, to test whether the functional form is non-linear or if there is an interaction, a linear interaction term and higher order terms of the assignment variable can be added to the basic regression-discontinuity design. Including interaction and higher order terms in the regression-discontinuity model can be done to see if including these

additional predictors have a significant impact on the estimate and stability of the treatment effect (Shadish et al., 2002; Trochim, 1984).

Shadish et al. (2002) propose a strategy to model the functional relationship by first over-fitting the regression-discontinuity model by adding more polynomial terms along with their respective interactions to the regression-discontinuity design, and then dropping non-significant terms from higher to lower order. They also suggest monitoring the stability of the estimate of the treatment effect for the various functional forms that are considered. If the estimate of the treatment effect becomes noticeably unstable given various interactions and non-linear functional forms, this suggests that non-linearities or interactions are likely to be present and would need to be included in the regression-discontinuity design model to insure that the estimate of the treatment effect remains unbiased.

Sample Size Considerations

Even though the regression discontinuity design can be used to find an unbiased estimate of the treatment effect, one problem with using the design in practice is that it has significantly less power than does a true random experiment (Cappelleri et al., 1994; Cappelleri & Trochim, 1992; Shadish et al., 2002). In order to detect even medium effect sizes, the regression-discontinuity design requires approximately 2.5 times as many participants to reach 80% power as compared to a randomized experiment, and approximately 3 times as many participants would be needed to detect a small effect (Cappelleri et al., 1994).

Adding Covariates

Since the regression-discontinuity model estimates the treatment effect at the cutoff score, where individuals in the treatment and control groups are equivalent in all respects except for the group assignment, no other covariates need to be added to the regression-discontinuity design model in order to obtain an unbiased estimate of the treatment effect (Berk & DeLeeuw, 1999). However, just as with a true random experiment, including covariates in the regression-discontinuity design can increase the efficiency of the estimate of the treatment effect (Judd & Kenny, 1981; Trochim, 1984), and can also be used as an empirical check for random assignment (Pettersson-Lidbom, 2003). Furthermore, another important reason for adding covariates to the regression-discontinuity model is to increase the power of the regression-discontinuity design (Light et al., 1990). Without control variables the regression-discontinuity design produces an unbiased estimate of the treatment effect; with control variables added to the regression-discontinuity model the estimate of the treatment effect is more efficient and the analysis can be more powerful (Judd & Kenny, 1981).

Selection Bias

In a regression-discontinuity design, all of the individuals in the study have to comply with the assignment to either the treatment or control group based only on the score they received on the assignment variable. If 100% of the participants adhere to the assignment based on the score they received on the assignment variable, this is referred to as a sharp regression-discontinuity design because this generates a “sharp” and perfectly determined discontinuity at the cutoff score (Trochim, 1984). If there are participants who elect not to abide by their assignment, this results in a “fuzzy” discontinuity at the cutoff score (Trochim, 1984). If the number of participants who do not adhere to their assignment represent only a small portion of the sample, then removing them from the analysis will usually not have a significant impact the estimate of the treatment effect (Shadish et al., 2002; Trochim, 1984). However, if a significant portion of the sample does not comply with their group assignment, the selection process would need to be modeled appropriately and included in the regression-discontinuity design model.

Modeling Selection Bias

Selection effects can bias the estimate of the treatment effect if there is a significant portion of the sample that does not adhere to their group assignment. However, if there are only a few participants who elect not to comply with their assignment based on the cutoff score of the assignment variable, this will not likely bias the estimate of the treatment effect because the group assignment is known and is almost perfectly measured (Shadish et al., 2002). However, when a larger proportion of subjects do not adhere to their assignment, instrumental variables estimation can be used to model the selection process (Lesik, 2006; Lesik, 2007).

Instrumental variables estimation can be used to model selection by estimating the effect of the “treatment-on-the-treated” (Angrist & Krueger, 1991). This is done by including in the analysis those participants who did not adhere to their group assignment (Lesik, 2006, 2007). Modeling selection effects with instrumental variables estimation requires a two-stage modeling process. The first-stage requires that the assignment variable and the centered placement score is used to predict the probability that a subject actually *participates* in the treatment program. This probability can be estimated by using a first-stage linear probability model as presented in Model (2):

$$PART = \gamma_0 + \gamma_1 TREAT + \gamma_2 CPS + \gamma \vec{X} + \varepsilon \quad (2)$$

Where *PART* is a binary variable that represents whether or not the subject actually participated in the treatment program (for instance *PART* = 1 if the subject actually participated in the treatment program, *PART* = 0 if the subject did not participate in the treatment program): *TREAT* is the binary assignment variable that

indicates whether an individual was assigned to the treatment program based on the score that the individual received on the assignment measure: CPS is the assignment variable centered at the cutoff score: and \vec{X} is a vector of covariates (if covariates are being included).

It may seem tempting to use either a logit or probit analysis for modeling the first stage probability of an instrumental variables estimation because a linear probability model may generate probabilities which are greater than 1 or less than 0. However, using any regression model other than a linear probability model such as a logit or probit model for fitting the first stage of the instrumental variables estimation has the potential to produce estimates of the treatment effect which are inconsistent (Wooldridge, 2002, 2003).

The second-stage model requires including the predicted probability of the actual program entered, ($\hat{P}ART$) which is obtained from the first stage model to replace the binary treatment indicator ($TREAT$) in model (1) as follows:

$$Y = \beta_0 + \beta_1 \hat{P}ART + \beta_2(CPS) + \gamma \vec{X} + \varepsilon \quad (3)$$

Therefore, the estimate of β_1 represents the impact of actually participating in the treatment program on the given outcome variable Y . Before a reasonable inference can be made using instrumental variables estimation, there are two conditions which must hold true in order for the instrumental variables estimation to provide an unbiased estimate of the treatment effect, β_1 , obtained from the second-stage model. For the first condition, the actual program that the participant was engaged in must be highly correlated with the treatment indicator variable (Wooldridge, 2002, 2003). For the second condition, the probability that a subject participated in the treatment program must not be related to any other unobserved factors that may be associated with the outcome measure (Wooldridge, 2002, 2003).

Typically, if only a handful of subjects do not adhere to their assignment, then excluding them from the sample and re-running the regression-discontinuity analysis and evaluating the impact this has on the treatment effect can be an alternative to using instrumental variables estimation (Leake & Lesik, 2007).

Threats to Validity

Just as with a true random experiment, it may appear that the regression-discontinuity design is relatively easy to use in practice because there are only three variables that need to be included in the regression-discontinuity model; the outcome variable, the binary treatment indicator, and the placement score centered at the cutoff. However, similar to a true random experiment, the crux of making reasonable inferences using the regression-discontinuity design relies on the investigators ability to identify and address any potential threats to validity. Identifying and addressing threats to the validity of the regression-discontinuity design is at the heart of using

the regression-discontinuity design in practice because depending on the nature of the study and the type of analysis that is being used, there can be numerous factors which can make conclusions drawn from the regression-discontinuity design suspect (Leake & Lesik, 2007; Lesik, 2006, 2007).

If a sudden, naturally occurring discontinuity other than the treatment effect coincides exactly with the cutoff score, this could bias the estimate of the treatment effect (Shadish et al., 2002). However, this is unlikely because a sudden, natural discontinuity coinciding exactly with the cutoff point is not probable in a regression-discontinuity design (Shadish et al., 2002). Though unlikely, there are other potential threats to validity such as *history*, *testing*, *instrumentation*, *maturation*, and *outside effects* that could bias the estimate of the treatment effect (Shadish et al., 2002).

History refers to any event that could occur between when the treatment begins and when the outcome is measured that could have affected the outcome irregardless of whether or not the treatment was received (Shadish et al., 2002). In a regression-discontinuity design, this is unlikely to be an issue because any such event or events would have to affect the outcome measure only for those participants in either the treatment group or in the control group (Shadish et al., 2002).

Testing is also unlikely to affect the discontinuity as long as participants are assigned to the treatment or control group using the same assignment variable (Shadish et al., 2002).

Instrumentation changes occurring precisely at the cutoff score are also unlikely as long as neither the assignment variable nor the cutoff score were altered during the time in which the data was being collected (Shadish et al., 2002).

Maturation would suggest that those participants who score either higher or lower on the assignment variable are more or less likely to experience the outcome of interest (Shadish et al., 2002). If this were the case, this could generate a nonlinear relationship or interaction between the assignment predictor and the outcome variable that would need to be modeled appropriately to ensure that an unbiased estimate of the treatment effect can be obtained. Depending on the type of regression-discontinuity analysis (such as ordinary least squares or logistic regression), non-linear relationships and interactions can be assessed using graphical techniques such as the lowess smoother, or by including higher order terms and interactions and verifying that such terms do not impact the estimate of the treatment effect.

However, the biggest challenge to using the regression-discontinuity design is that can be numerous other *outside effects* which can pose the greatest threat to the validity of the regression-discontinuity design (Leake & Lesik, 2007; Lesik, 2006; Lesik, 2007). Such outside effects often can be very difficult to identify and even more difficult to assess because they depend on the type of data that collected, the regression modeling strategy that is being used, and the behaviors of those who participate in either the treatment or control group. For instance, if you are evaluating the effect of a treatment program at a given point in time, and if some individuals who were assigned to participate in the program did not participate in the program during the given time, then including these participants in the sample could bias the estimate of the treatment effect (Lesik, 2007).

Sensitivity Analysis

The crux of using the regression-discontinuity design in practice is to be able to identify and address any and all potential threats to validity that may bias the estimate of the treatment effect. For instance, if you are using the regression-discontinuity design to determine if a remedial English program is effective in helping students earn better first-year grade point averages, you need to be aware of any factors, such as differences in student behaviors that may influence your analysis (Leake & Lesik, 2007). For example, including students in the analysis who may have received different amounts of treatment, or who did not maintain continuous enrollment for their entire first-year, could have the potential of biasing the estimate of the treatment effect (Leake & Lesik, 2007).

The easiest way to deal with potential threats to validity is to run a fairly simple sensitivity analysis where those students who may behave differently than expected are removed from the analysis and the analysis is rerun to see if including these students in the sample has an impact the estimate of the treatment effect (Leake & Lesik, 2007; Lesik, 2006; Lesik, 2007).

Applying the Regression-Discontinuity Design in Practice

The following discussion will illustrate in a detailed, step-by-step manner how to use the regression-discontinuity design in higher education research. The regression-discontinuity design is an ideal method to evaluate remedial and developmental education programs because such programs often use a pretest which can be used as an exogenous assignment variable (Leake & Lesik, 2007; Lesik, 2006, 2007). The regression-discontinuity analysis to follow will be used to describe whether a developmental education program (treatment) has a causal impact on five-year graduation rates (effect).

Data

The data used for this illustration was obtained from a sample of 417 students who enrolled as full-time, first-time freshmen at a large state university in the northeastern United States. The data collected consists of various measures such as the score received on a continuous assignment variable, a binary treatment indicator, and a collection of covariates such as a self-reported measure of ethnicity, SAT Scores, major category, gender, and graduation status. These measures are described in detail below.

The Assignment Variable

The assignment variable consists of the score that a student received on a computerized pre-test taken prior to enrolling at the university. This assignment variable is an

exogenous assignment variable because all incoming first-time, full-time freshmen were required to take the computerized pre-test before they could enroll at the university. The scores received on this assignment variable range from 70 to 100, and the predefined exogenous cutoff-score was set at 85. The cutoff score of 85 was established to assess whether or not a student was proficient in the subject.

Treatment Indicator

The assignment to the treatment program was represented by the binary variable *TREAT*. The assignment to the treatment program was based strictly on the score that a student received on the pre-test. Subjects who scored less than the cutoff score of 85 were assigned to participate in the treatment program ($TREAT = 1$), and subjects who scored 85 or above were exempt from participating in the treatment program and thus were assigned to the control group ($TREAT = 0$). Thus, those students who did not meet the level of proficiency on the placement examination were perceived to benefit from participating in the treatment program.

Ethnicity

A student's self-reported ethnicity was described by the binary variable *MINORITY*, where $MINORITY = 1$ if the student self-identified as non-white, and $MINORITY = 0$ if the student self-identified as white.

SAT Scores

The continuous variable *SATTOTAL* represents the combined score that a student received on the SAT examination. All students are required to take the SAT examination prior to enrolling at the university.

Major Category

The binary variable *MAJOR* represents a student's initial choice of major when they first enrolled at the university, where $MAJOR = 1$ if the student initially declared a science or math related major (such as mathematics, chemistry, physics, etc.), and $MAJOR = 0$ if the student declared a non-science or non-math related major (such as English, art, history, etc.)

Gender

The binary variable *FEMALE* represents a student's self-reported gender, where *FEMALE* = 1 if the student identified as female, and *FEMALE* = 0 if the student identified as male.

Graduation Status

The binary outcome variable *GRADUATE* represents whether or not a student completed all of their degree requirements and graduated from the university during their first five years, where *GRADUATE* = 1 if the student graduated from the university during their first five years, and *GRADUATE* = 0 if the student did not graduate from the university during their first five years.

The Initial Regression-Discontinuity Analysis

Given that we are using an assignment variable with a known cutoff score, it becomes possible to isolate the treatment effect by including the treatment indicator and assignment variable as predictors in a regression model (Berk & DeLeeuw, 1999). Because the outcome we are interested in is a binary variable, the regression-discontinuity design can be incorporated within a logistic regression model as follows (Berk & DeLeeuw, 1999; Berk & Rauma, 1983):

$$\text{logit}(\text{GRADUATE}) = \beta_0 + \beta_1 \text{TREAT} + \beta_2 (\text{CPS}) \quad (4)$$

Where *TREAT* is the binary treatment indicator, *CPS* is the continuous placement score which is centered at the cutoff score of 85, (*CPS* = Assignment Score - 85). *GRADUATE* is the binary outcome variable where *GRADUATE* = 1 if the student graduated during their first five years, and *GRADUATE* = 0 if the student did not graduate during their first five years. The parameter estimates, bootstrap standard errors, and *p*-values for fitting Model (4) with the initial sample of data (*n* = 417) appears in Table 1.

The estimate of the treatment effect $\hat{\beta}_1 = -0.146$ is insignificant (*p* = 0.714), thus suggesting that the *assignment* to the treatment program does not impact five-year graduation rates. However, before we can be certain that we are making a meaningful inference, we need to verify that the model specification between the assignment predictor (the centered placement score) and the outcome variable (whether or not a student graduated within five years) is specified correctly. We also may want to include covariates in the model, model any selection effects, and determine if there are any threats to the validity of the analysis.

Table 1 Parameter estimates and bootstrap standard errors for fitting the initial regression discontinuity design as described in Model (4)

Parameter	Estimate	Bootstrap	
		standard error	p-value
<i>TREAT</i>	-0.146	0.398	0.714
<i>CPS</i>	0.007	0.024	0.776
<i>Constant</i>	-0.472	0.253	0.062

Model Specification

Model (4) specifies that the relationship between the assignment predictor (*CPS*) and the outcome variable (*GRADUATE*) is linear because the assignment predictor is specified to the first power. In order to make a reasonable inference about the impact of the treatment effect, we need to verify that a linear functional form is appropriate for the data we are analyzing, and that non-linear terms and interactions do not have an impact on the estimate of the treatment effect.

There are two rather simple ways to assess the functional form specification of the regression-discontinuity model; (1) because we are using the regression-discontinuity design within a logistic regression model, we can use exploratory analysis to graphically display the relationship between the assignment and outcome variables by using a lowess smoother, or (2) we can include higher order non-linear terms along with their respective interactions to the regression-discontinuity model to see if the addition of these terms has a significant impact on the estimate of the treatment effect.

Because we are using the regression-discontinuity design within a logistic regression framework, we can graphically look at the functional relationship between the assignment predictor and outcome variable by graphing a lowess smoother. The lowess smoother for the given dataset ($n = 417$) is presented in Fig. 1. This graph suggests that the relationship between the assignment predictor and the outcome variable (whether or not a subject graduated within five years) may be non-linear.

However, instead of solely relying on a lowess smoother to determine the correct functional form, we can also include non-linear terms and interaction terms in the regression-discontinuity design model to see if the addition of these terms is significant in the model, and we can also see if the estimate of the treatment effect remains stable when including such non-linear terms and interactions. Table 2 presents the parameter estimates, bootstrap standard errors, and p -values using the strategy suggested by Shadish et al. (2002) which begins by first over-fitting the model with cubic terms and interactions and then dropping non-significant terms from higher to lower order is described in Model (5), Model (6), and Model (7) below:

$$\text{logit}(\text{GRADUATE}) = \beta_0 + \beta_1 \text{TREAT} + \beta_2(\text{CPS}) + \beta_3 \text{TREAT} * \text{CPS} + \beta_4 \text{CPS}^2 + \beta_5 \text{TREAT} * \text{CPS}^2 + \beta_6 \text{CPS}^3 + \beta_7 \text{TREAT} * \text{CPS}^3 \quad (5)$$

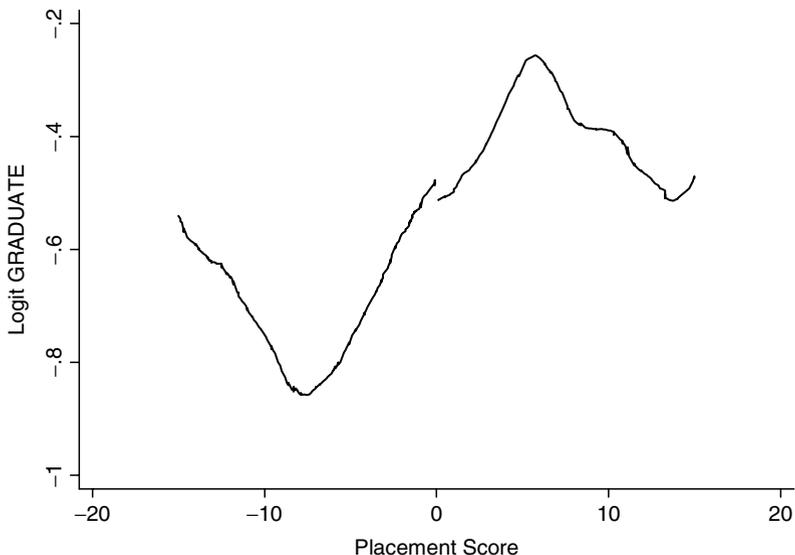


Fig. 1 Lowess smoother of the relationship between the assignment variable and outcome variable for the entire sample ($n = 417$)

$$\text{logit}(GRADUATE) = \beta_0 + \beta_1 TREAT + \beta_2(CPS) + \beta_3 TREAT * CPS + \beta_4 CPS^2 + \beta_5 TREAT * CPS^2 \tag{6}$$

$$\text{logit}(GRADUATE) = \beta_0 + \beta_1 TREAT + \beta_2(CPS) + \beta_3 TREAT * CPS \tag{7}$$

Table 2 illustrates that the quadratic model as presented in Model (6) may be more appropriate for this set of data ($p < 0.10$ for the quadratic interaction term).¹

For instances such as this where it may be difficult to accurately describe the functional relationship between the assignment predictor and the outcome variable, it may be necessary to reduce the sample around the cutoff score until the appropriate relationship can be determined. This can help eliminate any bias which may be generated by incorrectly specifying the functional form. Figure 2 provides the lowess smoother which describes the relationship between the assignment predictor and outcome variable for a reduced sample of students who scored only within ten points on either side of the centered cutoff score of 0. Notice that the relationship between the assignment predictor and outcome variable is approximately linear (on the logit scale), and also the addition of quadratic and cubic terms along with their

¹Using a p -value < 0.10 as an initial screening criteria to determine if non-linear terms or their interactions should be added to the regression-discontinuity model is a conservative approach to variable selection for a logistic regression analysis as described in Mickey and Greenland (Mickey & Greenland, 1989).

Table 2 Parameter estimates, bootstrap standard errors, and *p*-values for adding non-linear terms to the basic regression discontinuity design model eliminating non-significant terms from higher to lower order (*n* = 417).

Parameter	Model (5)			Model (6)			Model (7)		
	Estimate	Bootstrap Standard Error	<i>p</i> -value	Estimate	Bootstrap Standard Error	<i>p</i> -value	Estimate	Bootstrap Standard Error	<i>p</i> -value
<i>TREAT</i>	1.197	0.919	0.193	0.570	0.532	0.283	-0.153	0.374	0.682
<i>CPS</i>	0.367	0.374	0.326	0.128	0.133	0.335	0.004	0.031	0.906
<i>Constant</i>	-1.009	0.773	0.192	-0.742	0.421	0.078	-0.448	0.290	0.123
<i>TREAT</i> *	0.102	0.542	0.851	0.062	0.186	0.741	0.006	0.046	0.904
<i>CPS</i>									
<i>CPS</i> ²	-0.049	0.053	0.352	-0.008	0.009	0.338			
<i>TREAT</i> *									
<i>CPS</i> ²	0.107	0.079	0.175	0.020	0.012	0.093			
<i>CPS</i> ³	0.002	0.002	0.420						
<i>TREAT</i> *									
<i>CPS</i> ³	0.000	0.003	0.969						

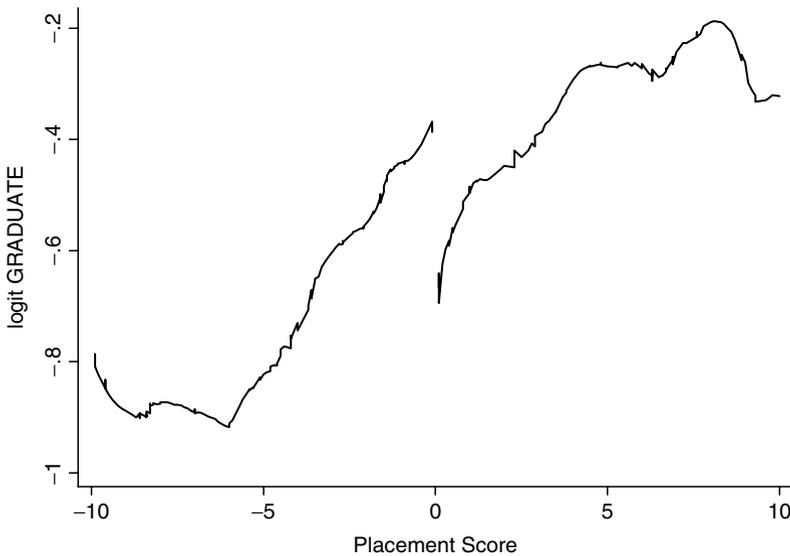


Fig. 2 Lowess smoother of the relationship between the assignment variable and outcome variable for the sample of subjects who scored within ten points of the cutoff score (*n* = 269)

appropriate interactions using the strategy suggested by Shadish et al. (2002) is non-significant (*p* > 0.12 for the quadratic model with a quadratic interaction term). By re-running the regression discontinuity analysis with only those subjects who scored within ten points of the cutoff score using the linear model as presented in Model (4) gives parameter estimates and standard errors as presented in Table 3.

Table 3 Parameter estimates and bootstrap standard errors for fitting the regression-discontinuity design for the reduced sample of students who score within ten points of the cutoff score ($n = 269$)

Parameter	Estimate	Bootstrap standard error	p-value
<i>TREAT</i>	0.222	0.504	0.659
<i>CPS</i>	0.056	0.051	0.279
<i>Constant</i>	-0.646	0.298	0.030

Adding Covariates

Because the regression-discontinuity design model emulates a random assignment at the cutoff score, where students are on average equivalent in all respects except for the assignment to the treatment program, no other covariates are needed to obtain an unbiased estimate of the treatment effect using the regression-discontinuity design (Berk & DeLeeuw, 1999; Berk & Rauma, 1983). However, by including covariates this can increase the efficiency of the estimate of the treatment effect (Judd & Kenny, 1981; Trochim, 1984), and can be used as an empirical check of whether or not the treatment and control groups were established as equivalent (Leuven et al., 2004; Pettersson-Lidbom, 2003; vanDerKlaauw, 2002).

If the treatment and control groups are established as equivalent at the cutoff score, then it would be expected that including any additional covariates would not be significant and the estimate of the treatment effect would remain stable. For those individuals who scored within ten points of the cutoff score, Model (8) represents a linear regression-discontinuity model which includes covariates:

$$\text{logit} (GRADUATE) = \beta_0 + \beta_1 TREAT + \beta_2 (CPS) + \beta_3 MINORITY + \beta_4 SATTOTAL + \beta_5 MAJOR + \beta_6 FEMALE \quad (8)$$

Table 4 presents the parameter estimates and bootstrap standard errors for Model (8).

Notice in Table 4 that the only covariate that was significant at the 10% level was the initial choice of major. This could suggest that the treatment and control groups may not be equivalent with respect to this given variable, and hence this serves as an empirical check on whether or not the treatment and control groups were established as the same. However, this is not likely to be a concern because less than 10% of the sample self-identified as minority.

Thus, given our analysis so far, we have concluded that there is no difference in the five-year graduation rates between those students who were *assigned* to the treatment program as compared to those subjects who were assigned to the control group. Based on our linear model specification, we have reason to believe that this is an unbiased estimate of the effect of the *assignment* to the treatment program on five-year graduation rates.

Table 4 Parameter estimates, bootstrap standard errors, and p -values for fitting the regression-discontinuity design for the reduced sample of students who score within ten points of the cutoff score including covariates ($n = 261$)

Parameter	Estimate	Bootstrap standard error	p-value
<i>TREAT</i>	0.345	0.461	0.454
<i>CPS</i>	0.073	0.038	0.055
<i>MINORITY</i>	0.285	0.417	0.495
<i>SATTOTAL</i>	0.001	0.001	0.646
<i>MAJOR</i>	-0.658	0.378	0.082
<i>FEMALE</i>	0.045	0.283	0.875
<i>Constant</i>	-1.266	1.557	0.416

Modeling Selection Effects

Approximately 7% of those students who scored within ten-points of the cutoff score did not comply with their assignment to either the treatment or control group based on the score they received on the assignment variable. One simple strategy to see if including these non-compliers in the regression-discontinuity analysis has an impact on the estimate of the treatment effect, is to remove these non-compliers from the ten-point discontinuity sample and then re-run the analysis without them (Leake & Lesik, 2007; Lesik, 2006, 2007). The idea behind removing the non-compliers from the sample is to determine if the estimate of the treatment effect remains relatively stable whether or not these non-compliers are included in the sample or not. Table 5 gives the parameter estimates, bootstrap standard errors, and p -values for running the analysis with the non-compliers removed from the sample. Notice that although the estimate of the treatment effect remained insignificant it did not remain stable. Therefore, by including these non-compliers in the analysis this may introduce bias in the estimate of the treatment effect.

Another strategy to address the non-compliers is to use instrumental variables estimation. Using instrumental variables estimation to model the effect of selection consists of including in the sample those non-compliers in the regression-discontinuity analysis. This is done by first modeling the probability of participating in the treatment program with a first-stage linear probability model and then using the predicted values from the first stage in place of the dichotomous treatment indicator in the second stage. This gives first-stage parameter estimates and standard errors as presented in Table 6, and second-stage parameter estimates and standard errors as presented in Table 7.

Notice that in all of the analyses that we have performed thus far, bootstrap standard errors are reported. The reason for doing this is to avoid the need to adjust the standard errors for the instrumental variables estimate (Wooldridge, 2002, 2003).

Table 5 Parameter estimates, bootstrap standard errors, and *p*-values for fitting the regression-discontinuity design for the reduced sample of students who score within ten points of the cutoff score including covariates excluding those subjects who did not adhere to their placement assignment (*n* = 243)

Parameter	Estimate	Bootstrap standard error	<i>p</i> -value
<i>TREAT</i>	0.737	0.532	0.165
<i>CPS</i>	0.100	0.049	0.045
<i>MINORITY</i>	0.293	0.440	0.506
<i>SATTOTAL</i>	0.002	0.001	0.192
<i>MAJOR</i>	-0.706	0.402	0.079
<i>FEMALE</i>	0.041	0.263	0.877
<i>Constant</i>	-2.537	1.403	0.071

Table 6 First-stage instrumental variables parameter estimates, bootstrap standard errors, and *p*-values for the ten-point discontinuity sample (*n* = 261)

Parameter	Estimate	Bootstrap Standard Error	<i>p</i> -value
<i>TREAT</i>	0.848	0.055	0.000
<i>CPS</i>	0.000	0.004	0.923
<i>MINORITY</i>	0.103	0.050	0.037
<i>SATTOTAL</i>	-0.000	0.000	0.261
<i>MAJOR</i>	-0.061	0.034	0.076
<i>FEMALE</i>	-0.037	0.041	0.366
<i>Constant</i>	0.286	0.159	0.072
R-squared statistic	0.743		

Table 7 Second-stage instrumental variables estimation parameter estimates and bootstrap standard errors for the ten-point discontinuity sample (*n* = 261)

Parameter	Estimate	Bootstrap standard error	<i>p</i> -value
<i>PÂRT</i>	0.407	0.592	0.492
<i>CPS</i>	0.073	0.046	0.115
<i>MINORITY</i>	0.243	0.406	0.550
<i>SATMTOTAL</i>	0.001	0.001	0.606
<i>MAJOR</i>	-0.633	0.386	0.101
<i>FEMALE</i>	0.060	0.298	0.841
<i>Constant</i>	-1.382	1.552	0.373

Hence, because the estimate of the treatment effect of participating in the developmental education program still remains insignificant ($\beta_1 = 0.407$, $p = 0.440$), we have reason to believe that participating in the developmental education program does not impact students graduating within five years. In other words, participating in the developmental program does not have a causal effect on whether or not students graduate from the university during their first five years. However, this inference relies on there being no threats to validity that could be introducing bias. If such threats are identified, then simple sensitivity analysis could be used to address such threats (Leake & Lesik, 2007, Lesik, 2006, 2007).

Implications for the Regression-Discontinuity Design

The regression-discontinuity design as described in this chapter is a method that institutional researchers can use to infer whether a casual relationship exists between participation in a treatment program and a outcome measure by emulating a random experiment even when it may not be possible to actually use a random assignment to establish equivalent treatment and control groups. Researchers and policymakers who are interested in establishing a causal link between educational programs and a desired outcome measure, need to consider three key factors in order to obtain unbiased and valid estimate of the treatment effect. First, the use of an exogenous assignment variable is needed to initially partition subjects into treatment and control groups before the treatment actually begins, and participants must be encouraged to adhere to their placement. Second, a large amount of data within a very narrow interval around the cutoff score is needed to avoid relying on the correct functional form specification of the regression-discontinuity model. Otherwise, if a larger interval around the cutoff score is needed to achieve adequate power, then the investigator needs to be sure that the regression-discontinuity model is specified correctly with respect to the relationship between the assignment and outcome variable. Third, and probably most important, the investigator needs to make sure that any effects that could potentially bias the estimate of the treatment effect are identified and addressed in an appropriate manner.

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From Creation to Cultural Resistance and Expansion: Research on American Indian Higher Education

Roger Geertz González

Introduction

Since the establishment of the first Tribal College, Diné College (1968), as well as the subsequent 31 Tribal Colleges and Universities (TCUs) in the United States in the 1960s and 1970s, college access for thousands of American Indians have increased precipitously.¹ TCUs were established primarily to meet the cultural and educational needs of American Indians and to counter the disparaging effects of over 500 years of colonial-settler imposed education. Today, more than 30,000 American Indians, 85% of whom live below the poverty rate, attend TCUs (American Indian College Fund, 2007). Nevertheless, many more college-aged American Indians do not attend because of various factors, including, and perhaps especially because of, having to uproot from their Indigenous Tribes and attend TCUs that are far away from their tribal homes.

Literature on American Indian college persistence demonstrates that attending a TCU for two years and then transferring to a non-TCU, or staying beyond two years at a four-year TCU, increases the chances of American Indians graduating from college (Brown, 2003; Jackson et al., 2003). Most TCUs are located in the Western part of the US. With 30.6% of American Indians living in the Southeastern part of the US and 9.1% living in the Northeast, college access for college-aged American Indians is very limited since there are no TCUs in these regions (U.S. Census Bureau, 2000). There are several non-TCU college programs that are geared towards recruiting and graduating American Indian students. However, these programs primarily serve as support programs for American Indians studying mainstream education. To maintain American Indian Tribal cultures, such as Tribal languages, Indigenous education and knowledge, and oral histories, TCUs and, at the least, TCU programming through

¹I will use in this paper the term “American Indian,” even though it may be common to use the term “Native American.” The terms “American Indian” and “Native American” are synonymous, according to Briggs, Arviso, McAuliffe, and Edmo-Suppah (2002, p. XIV). I will choose the former term for consistency. Whenever possible, however, I will use the nomenclature according to each specific tribe’s preferences.

partnerships with mainstream colleges and universities need to be expanded in the southeastern and northeastern parts of the US.

The following chapter will present a brief history of the education of American Indians with particular attention to higher education. An overview of current American Indian demographics will follow as well as a review of the current rates of collegiate access. A description of the history of the first American Indian colleges and universities will then follow. A review of American Indian higher education programs in the Northeast and Southeast will be provided, and, finally, a set of strategies will be offered for how American Indian higher education programming can be improved.

A Short History of the Education of American Indians

Any discussion of American Indian education in the US must be tempered by the settler-colonial educational policies that since 1492 have been used to raze the distinct and numerous American Indian tribal cultures and assimilate them into majority “White” culture. Historians and educators have identified distinct historical periods that also include distinct educational periods for American Indians. According to Almeida (1997), “native historians have identified five distinct periods since the European’s arrival in the America’s” (p. 761). To date, Almeida’s classification of American Indian historical periods provides a succinct categorization that is absent even from more current historical work, such as Reyhner and Eder’s *American Indian Education: A History* (2004) and Benham and Stein’s edited book, *The Renaissance of American Indian Education* (2003).

For Almeida (1997), the distinct periods include: the Creation period (prior to 1492), the Contact period (1492–1800), the Removal Era (1800–1830), the Reservation Era (1830–1929), The Reform Era (1930–1969), and Contemporary Resistance (1970–1997) (Almeida, 1997, p. 761). According to recent studies in Benham and Stein’s edited book, *The Renaissance of American Indian Education* (2003) and in Reyhner and Eder’s *American Indian Education: A History* (2004), American Indians since 1997 are beginning to determine their children’s own education, specifically by incorporating culturally relevant education. Thus, I will characterize the current period (since 1997) as a period of continued *Cultural Resistance and Expansion*. I will provide a brief description of each period next.

The Creation Period

During the Creation (prior to 1492), or pre-Contact period, American Indians educated their young through oral histories and experiential learning. This changed when the colonialists arrived in North America. But prior to that, American Indians educated their children in ways that would allow them to “survive on the land” and maintain their cultural heritage. According to Reyhner and Eder (2004),

Babies were taught not to cry by cutting off their air supply; this would prevent them from revealing the band's whereabouts to an enemy. The struggle for survival taught the Indians humility. They understood that, contrary to the teachings of Christianity, humans did not hold dominion over the earth but must live in harmony with it (p.14).

Sanchez et al. (1998) identify four specific educational stages that American Indian youth underwent during the Creation period. In the first stage (from birth to age 5), children were seen as dependent and shown what measures were necessary for survival. Emphasis was on cultural survival, however, not physical, and the young were encouraged to participate in those activities that would ensure familial and tribal ties. In the second stage (ages 5 to 12), children usually became interested in one or more areas of tribal activity, and thus their talents in those areas were developed so that they could contribute to the community. One or two tribal mentors would be identified and help the young develop their skills in their chosen interest. During the third stage (ages 12 to 25), what youth were taught, learned, and practiced in their earlier education were now dedicated to the tribe, and the youths were able to assimilate knowledge of new cultures and changing circumstances with tribal tradition, thus ensuring that the past was integrated with the present and the future. In the final stage (25 to very elderly), the adult now develops the status of Elder and chooses an apprentice in order to pass on the skills developed over the course of his or her life, with the goals of maintaining tribal traditions and of allowing the community to adapt to changing conditions.

During the Creation period, therefore, the education of American Indians was dedicated to meeting the needs of surviving on the land and to maintaining their cultural heritage and familial and tribal ties. Education likely took the form what we would now call apprenticeship. But all this changed when the Europeans arrived in North America.

The Contact Period

In the Contact period (1492–1800), European settlers in the thousands took ownership of once held Indigenous lands in North America. War, slavery, disease, and famine decimated the once numerous American Indian tribes. Some of the surviving tribes soon were overrun, an invasion aided by European missionaries who sought to convert American Indians to Christianity and to force them to adapt to European customs and languages, namely English, French, or Spanish. English Protestants, in particular, focused on teaching American Indians Puritanical notions of industry and thrift as well as Christian ethics, while the French blended Christianity with French culture and language in their instruction of American Indians (Lankford & Riley, 1986).

With their “encomienda” system, or trusteeship over Indigenous peoples, Spanish conquistadors were given land grants “to civilize and Christianize ‘their’ Indians, but the Spanish conquerors often worked the Indians to death in mines and fields in their rush to return to Spain rich” (Reyhner & Eder, 2004, p. 17). However, the landowners failed to “educate” Indigenous peoples and so Charles V, the King of Spain, transferred the responsibility to Catholic friars (Reyhner & Eder, 2004). The Spanish created missions “reserved exclusively for Native

Americans as colonial policy dictated the separation of whites from Indians in the mission” (MacDonald, 2004, p. 9). Spanish missions were “purposefully designed to replace Native American languages, religions, dress, and other cultural attributes with the Spanish language, Roman Catholic faith, and European customs and mores” (MacDonald, 2004, p. 9).

This missionary period also extended to the American colonial colleges. “In 1755, in an attempt to garner Indian support for the Revolution, the Continental Congress appropriated \$500 to support Indian youths at Dartmouth” (Reyhner & Eder, 2004, p. 33). However, this support specifically was to “Christianize” the American Indians. For example, according to its charter, written in 1769, Dartmouth was founded “for the education and instruction of youth of the Indian tribes in this land in reading, writing, and all parts of learning which shall appear necessary and expedient for civilizing and christianizing children of pagans, as well as in all liberal arts and sciences, and also of English youth and any others” (Charter of Dartmouth College, 1769). According to its website, the College of William and Mary (no date), established in 1690, had as part of its mission the education of American Indians so “that the youth may be piously educated in good letters and manners, and that the Christian Faith may be propagated amongst the Western Indians” (<http://www.wm.edu/hermajesty/charter.php>).

Similarly, Harvard College was also founded in part to Christianize American Indians. According to its Charter, Harvard was founded so that it “may conduce to the education of the English and Indian youth of this country, in knowledge and godliness” (Harvard University Library, 1650). Harvard’s decision to educate Indians was not solely for the purpose of assimilating them into English society, but because they did not have enough students. (Harvard Faculty of Arts and Sciences, no date). Around 1655, Harvard published *The Day Breaking If Not the Sun Rising of the Gospel with Indians in New England*, a pamphlet to garner funding from the New England Company which promised to fulfill its mission of Christianizing Indians (Harvard Faculty of Arts and Sciences, Founding, no date). According to Thelin (2004), this policy was “disastrous”:

After a few years of high attrition among Native American students, the colleges had to conduct a strategy for holding on to missionary endowments while shifting attention away from educating heathens and back toward instilling knowledge and responsibility into young gentlemen. Tellingly, the council of Indian chiefs who had initially agreed to send their sons to the colleges felt that colonial education had rendered their future chiefs ‘good for nothing’ (p. 30).

Although the missionary period overall failed to convert most American Indians and destroy their traditional cultures (Lankford & Riley, 1986), it left a lasting impact on them, such as, appropriately, a suspicion of “European” education that has lasted to this day.

The Removal Era

The Removal Period (1800–1830) is characterized by the heightened attempt by the US government to gain title to American Indian lands. The Indian Removal Act of 1830 was the culmination of these land grabs which led to The Black Hawk War

of 1832, The Creek War of 1836, and The Second Seminole War (1835–1842). President Andrew Jackson initiated the Act to remove remaining American Indian tribes in the Southeast, such as the Cherokee, Chickasaw, Choctaw, Creek, and Seminoles, also known by the misnomer as the “Five Civilized Tribes”, to Oklahoma so that Whites could settle in the newly established US territory of Florida. Ironically, by 1819, before removal, “approximately 200 schools, seminaries, and academies were established among the five tribes” (Manuelito, 2005, p. 75). Because of this, “the population of these tribes had a 90 percent literacy rate compared to the much lower literacy rate of non-Indian youth in surrounding communities and states” (p. 75).

The Cherokee took the removal order to the Supreme Court, but “the discovery of gold in the Georgia portion of the Cherokee Nation doomed their chance to retain their ancestral lands” (Reyhner & Eder, 2004, p. 48). In 1838, Congress removed “an estimated 4,000 of the 115,000 [Cherokee] Indians who started on what became known as the Trail of Tears” where they “died from dysentery, malnutrition, exposure, or exhaustion before they reached Oklahoma” (p. 50). According to the US Senate’s 1969 report, *Indian Education: A National Tragedy—A National Challenge*, the US government since 1778 had never complied with its treaty obligations promising education for American Indians in exchange for their lands. The 1972 Indian Education Act tried to rectify the years of US government neglect by providing millions in federal dollars to provide funding for kindergarten through postsecondary education for American Indians.

The Reservation Era

The Reservation Era (1830–1929) brought in a new wave of assimilation attempts by the US government. These included placing American Indians on barren reservations far away from their traditional lands. This was made possible because of tribal weakening resulting from the US government’s “systematic genocide, warfare, broken treaties, and the destruction of natural and food resources” (Almeida, 1997, p. 761). In 1851, Congress passed the Indian Appropriations Act which established the first reservation in Oklahoma. Soon after, hundreds of tribes were placed on reservations.

A few tribes like the Choctaw and Cherokee, however, had some educational benefits during this period. For example, after *The Treaty of Dancing Rabbit Creek* forcing thousands of Choctaw living in the southeast to Oklahoma, the Choctaw “understood that advanced education was an ultimate goal” for their people (Crum, 2007, p. 49). Additionally, the Choctaw believed that: (1) “highly educated leaders would lead the Choctaw nation”; (2) “Euroamerican education [was] a way to interact effectively with the white Americans”; and (3) “education [was] a ‘survival’ tactic in an ever-changing world” (p. 50).

However, the Choctaw molded white education to fit their cultural needs. According to Crum (2007), the “first way was by carrying out groupness behavior; the second was by returning to their native homeland; and the third was by carrying

out equal gender representation, especially in the last two decades of the nineteenth century” (p. 50). Their “groupness” behavior pertained to the decision to send students to mainstream colleges:

The Choctaw, as an Indian nation, applied a tribal or group behavioral pattern to a new situation; in this case, earmarking specific postsecondary institutions. This groupness orientation—“Itapela Hosh Nana Yakomichi,” or “Doing things as a Group”—became evident in 1842 when the Choctaw national council, in accordance with the 1830 treaty, decided to send four groups of students to the following colleges: ten to Jefferson College in Pennsylvania; ten to Indiana Asbury University (today’s Purdue); ten to Ohio University; and ten to an unspecified college, later determined to be Lafayette College in Pennsylvania (Crum, 2007, p. 52).

According to Crum (2007), most Choctaw college students returned to the Choctaw nation for two reasons. The first one is that they felt “obligated” to return since their tribe paid for their higher education. Second, Choctaw students had a strong traditional kingship system that had existed before Euroamerican contact. Crum states, “Kingship provided identity to the individual, the family, the clan, and the village” and it “defined all Choctaw people and, therefore, all people who were *not* Choctaw” (p. 55). Choctaw also recreated higher education for themselves “by sending equal numbers of tribal men and women to college” (Crum, 2007, p. 63). This arrangement was called “Nakni micha ohoyo etilawit holisso apisa ashachi tok (men and women were equally based in school)” (Crum, 2007, p. 63).

The Choctaw’s decision to pursue gender representation in higher education had two possible influences. One was the earlier pre-contact Choctaw matrilineal tradition in which a person’s identity was based on the mother’s side of the family. In this earlier Indigenous world, women played an important role in the home education of children as well in as other aspects of life (Crum, 2007, p. 63). The second influence was that the Choctaw, influenced by missionaries, believed that “formalized education [was] a way to ‘uplift’ the people” and thus, “native women also came to be viewed as uplifting educational agents who could serve their children, husbands, and of course the larger tribal population” (p. 63).

In 1841, the Cherokee National Council set up a national school system under a superintendent of education with 11 schools in eight districts, which by 1852 was a “better common school system than the neighboring states of Arkansas and Missouri” (Reyhner & Eder, 2004, p. 55). In 1851, the Cherokee National Council opened up male and female high school seminaries. Nevertheless, the government’s focus was in giving American Indians a second-class “manual labor” or “industrial” education.” For example, “the Department of Interior’s 1899 annual report complained that the seminary’ curriculum was too academic and that girls were learning Latin and math instead of ‘domestic arts’ they needed” (Reyhner & Eder, 2004, p. 55).

By 1870, reservation day schools were established by Congress to assimilate American Indian children of other tribes. At these schools, English was taught, and spiritual practices were prohibited. Since these schools were on or near reservations, many Whites saw these as counterproductive. Whites then established reservation

boarding schools that were near the US government's American Indian agencies instead of reservations. Children were allowed to visit their families during the summers and Christmas. But again, many Whites saw this as counterproductive since the children would revert back to their cultural ways once back on their reservations.

In 1878, the Hampton Normal and Agricultural Institute in Virginia became the first off-reservation boarding school. The first students were 15 adult male American Indian "war hostages" (Almeida, 1997, p. 763). Later in 1878, Captain Richard Henry Pratt founded the Carlisle Indian School in Carlisle, Pennsylvania (Almeida, 1997). Thousands of American Indian children were forcibly removed from their parents and tribes and placed in these and other similar boarding schools around the US in order to "kill the Indian and save the man." The purpose of these schools was to educate American Indian males to work in trades, to educate American Indian females to be house servants, and to Christianize all of them. Many children died of diseases for which they had no immunity and of physical abuse by their White teachers. Nevertheless, the off-reservation boarding schools flourished during the late nineteenth century because of the increasing conflict over land and the US government's misguided policies (Almeida, 1997, p. 762). The American Indian boarding school system failed, however, because most of the students ran away back to their homes and very few graduated.

One of the unfortunate lasting legacies of the off-reservation boarding schools was that it "further destroyed the traditional roles of [Native American] women, as the girls were expected to learn European American techniques in childrearing, household maintenance, and food preparation" (Almeida, 1997, p. 765). However, some American Indian "women used their boarding school knowledge to help them lead their people to resist extinction" (Almeida, 1997, p. 766).

According to Reyhner and Eder (2004), in 1887 the General Allotment Act (also known as the Dawes Act) forced "European values of individualism and private initiative on Indian people, who traditionally lived under a communal system" (p. 81). The real purpose was to open the West to White settlement expansion. The Dawes Act granted 160 acres to each family and 80 acres to single persons over 18 years old and orphans under 18 years old. The Act resulted in the "perpetuated status of many [American Indians] as a permanent underclass even more dependent on the federal government" (p. 82). It also reduced tribal holdings from about 140 to 50 million acres. Many "allotments were split up through inheritance to the extent that was economical only to have them leased out by the owner's trustee, the Indian Office, later known as the Bureau of Indian Affairs" (p. 82). Another goal of the allotment program was to have American Indians attend public schools.

According to Lomawaima and McCarty (2002), "the history of federal and public education for American Indians is rife with examples of the contest between tribal sovereignty and federal powers" (p. 285). Tribes in the US have a singular legal status that both predates and is recognized by the US Constitution; specifically, the Commerce Clause, among other things, delegates the power to Congress to regulate commerce with foreign nations and US states with the American Indians. When Estelle Reel was appointed in 1898 as Superintendent

of “Indian Schools” in the US, she advocated “for selected women’s crafts as important economic mainstays” for American Indians (quoted in Lomawaima & McCarty, 2002, p. 285). However, this failed because “basketry, pottery, and rug weaving were too deeply embedded in cultural matrices that were too different from federally endorsed norms” (p. 286). Thus, for the next two decades American Indian language, clothing, hairstyle, art, religion, or personal expression was prohibited in schools, especially in the boarding schools.

The Reform Era

The publication of the 1928 report, *The Problem of the Indian Administration*, or the *Meriam Report*, initiated the Reform period (1930–1969). The report lambasted the American-Indian assimilationist policies of the US government, including the ineffective boarding schools (Institute of Government Research Studies in Administration, 1928). One of the important recommendations made by the report was that American Indians should be taught culturally appropriate material according to the needs of the different tribes (Institute of Government Research Studies in Administration, 1928). Because of the *Meriam Report*, bilingual education was introduced in American Indian schools.

Some historians argue that in the 1930s educators within the Progressive movement supported linguistically- and culturally-responsive curricula for American Indians (McClellan et al., 2005). However, Watras (2004) argues that progressive education did not advocate for linguistic and culturally responsive curricula and instead sought to introduce American Indians to “the ideal of democracy, the faith in science to improve the conditions of life, and the benefits of literacy” (p. 101). Nevertheless, in Reyhner and Eder’s (2004) detailed accounts of progressive education’s influence in American Indian education, it seems that progressive education taught American Indians to respect, appreciate, and learn from their culture, and also forced them to conform to mainstream societal ideals, especially the value of mainstream education.

Throughout the 1940s and 1950s, the federal government sought a “termination” policy with American Indians. Its goal was to “terminate its trust relationship with Native Americans, relocate Native Americans from reservations by incentive (as contrasted with earlier federal efforts to use force to put Native Americans on reservations), and shift responsibility for Native American services to the states” (McClellan et al., 2005, p. 10). For example, in 1953, Congress passed six termination laws (Reyhner & Eder, 2004). The result was that “many tribes were removed from the roll of those recognized by the federal government, and substantial numbers of Native Americans relocated to pan-Native enclaves in urban areas such as Chicago, Cleveland, and Oakland” (McClellan et al., 200, p. 10). In 1954, Congress began the dismantling of the Menominee reservation in Wisconsin. This eventually led to the termination of the tribe’s recognized status in 1961 (Reyhner & Eder, 2004, p. 236).

Even though the *Wheeler-Howard Act of 1934*, known as the *Indian Reorganization Act*, opened the doors for American Indians to control their own lands, government, welfare, and education, American Indians still did not have full and independent control over their lives. For example, beginning in the 1940s, “BIA educational personnel worked with Native language speakers and native illustrators to develop the Indian Life Readers, including the Pueblo Series, Sioux Series, and Navajo Series” (Lomawaima & McCarty, 2002, p. 287). However, some readers used these bilingual texts to promote Western agendas. For example, “*The Hen of Wahpeton* tells the story of the War-Bonnet family’s special incubator chick who learns to read and sing opera” (Lomawaima & McCarty, 2002, p. 288).

After World War II, Navajo veterans joined their tribe in pushing the US government to provide their children with on-reservation boarding schools per past treaties (Lomawaima & McCarty, 2002). By 1946, “there were fourteen thousand Navajo children without any school facilities available to them” (Reyhner & Eder, 2004, p. 237). The government responded by bussing Navajo children to distant schools in Oklahoma, California, and Oregon (Lomawaima & McCarty, 2002). In 1946, Hildegard Thompson directed the Special Navajo Five-Year Program that allowed elementary-age students to fill empty off-reservation schools; the schools were a more desirable option than sending the students further away to places like Oregon (Reyhner & Eder, 2004, p. 238). The program was taught in the Navajo language and used books written in the Navajo language; however, the program’s focus was bilingual education (p. 238).

When Thompson took over as director of the BIA, educational programs for American Indians began to decline (Reyhner & Eder, 2004). However, Reyhner and McCarty argue that “not all was bad” since “teachers got more cultural orientation, students got more opportunities to leave campus and visit school homes, and family-style dining was added to the school cafeteria” (p. 243). The changes led to the last era identified by Almeida (1997) for American Indians, the resistance period.

The Contemporary Resistance Era

The Contemporary Resistance Era (1970–1997) brought in a new wave of American Indian support for self-education. One of the most historic higher education developments was the founding of Tribal Colleges and Universities (TCUs) during this period. In the wake of the civil rights and American Indian self-determination movements of the 1960s, the first TCU was established in 1968. Navajo Community College, now called Diné College was established by and on the Navajo Nation. Today there are 31 other TCUs located primarily in the Western part of the US near reservations in 11 states and serving 250 American Indian Nations (American Indian College Fund 2007). These colleges were established specifically to maintain American Indian cultures by providing culturally-responsive curricula.

With the establishment of the *Coalition of Indian Controlled School Boards* in 1971, American Indian educators began to demand educational self-determination

(Reyhner & Eder, 2004). The passage of the *Indian Education Act* in 1972 was part of this new effort by American Indians to determine their own educational needs (Reyhner & Eder, 2004). It provided “all public schools with ten or more Indian students” with “funding for supplemental programs designed to meet the special needs of Indian students, including the use of culturally relevant and bilingual curriculum materials” (Reyhner & Eder, 2004, p. 254).

There were drawbacks during this period. For instance, in 1975, the US government passed the *Educational Assistance Act* to help American Indians establish control over their schools. However, American Indian women criticized the Act because they saw it as another “form of colonial domination” (Almeida, 1997, p. 768). As Almeida (1997) argues, “Through their work with the Survival Schools, this group of women had come to believe the U.S. government wanted to train a selected group of Native American educators who would see themselves and their Native nations through the eyes of the colonizer” (p. 768).

In the 1980s and early 1990s, government policies also supported mainstreaming American Indian students into non-American Indian public schools and began to “close all Bureau of Indian Affairs boarding schools and reservation day schools, regardless of their success rates” (Almeida, 1997, p. 768). However, public schools are a central source of conflict since they ignore (and perhaps even disparage) traditional American Indian values in favor of European-American ones. The results have been “high dropout rates, low achievement levels, and poor self-esteem for American Indian men and especially, for American Indian women” (Almeida, 1997, p. 768). This is particularly onerous considering that most American Indian youth attend non-American Indian public schools.

On October 30, 1990, President George H.W. Bush signed into law the Native American Languages Act, Title I of Public Law 101–477 (the “Languages Act”). According to Reyhner and Eder (2004), the Languages Act had three important implications. The first was a continuation of the policy of Indian self-determination (p. 309). The second was the reversal of the historical governmental practices to suppress Native languages in BIA and other schools. And the third was “a reaction to the attempt to make English the official language of the United States” (p. 309).

In 1991, the Secretary of Education, Lauro Cavazos, issued the report, *The Indian Nations at Risk* (INAR) (Reyhner & Eder, 2004). The report, according to Reyhner and Eder (2004), made several recommendations concerning “linguistically and culturally appropriate education for American Indian and Alaska Native students”:

It reflected a trend toward viewing schools as subcultures and the results of ethnographic classroom research. In Native education this research highlighted the cultural conflict occurring in classrooms in which teachers come from a different culture than the students. Untrained teachers—untrained in the sense of not being sensitive to cultural differences—often misinterpret and misunderstand the actions of their students. This ranges from misinterpreting the practice of some Native students not to look directly into one’s eyes to misunderstanding that subtle differences in students’ spoken and written English that reflect elements of a tribal language they may no longer speak (p. 315).

In line with this paradigm shift, in 1992, the White House Conference on Indian Education took place in Washington, DC. According to Reyhner and Eder (2004), the purpose of the conference was to establish a Board of Indian Education that would be responsible for all federal American Indian education programs. The White House Conference delegates “adopted 113 resolutions covering a variety of topics, ranging from the governance of Indian education to safe, alcohol- and drug-free schools” (p. 317).

Thus, in the Contemporary Resistance period identified by Almeida, American Indians moved toward self-determination in the education of their youth. Almeida ends her inquiry in 1997, but changes since then require the addition of a new period in American Indian education, one which I call the Cultural Resistance and Expansion Period.

The Cultural Resistance and Expansion Period

The Cultural Resistance and Expansion Period, which has taken place since 1997 and characterizes the present is one of struggle for linguistically and culturally appropriate curricula and appropriate updated technology for American Indians, which continue to increase, in the face of technological challenges. In 1998, President Bill Clinton resurrected the need to improve American-Indian and Alaska-Native education by setting six goals under Executive Order 13096: (1) improve reading and mathematics skills, (2) increase high school completion and postsecondary attendance rates, (3) reduce causes that negate educational performance such as poverty and substance abuse, (4) create drug-free school zones, (5) improve science education, and (6) expand educational technology (Reyhner & Eder, 2004). This Executive Order also called for research on the “effects on educational outcomes for students and schools of incorporating American Indian and Alaska Native language and culture in the school curriculum” (Reyhner & Eder, p. 318).

Since 1990, The Diné Teacher Education Program (DTEP) in cooperation with Arizona State University has successfully graduated Navajo students for K-8 teaching positions in schools primarily serving the Navajo Reservation (Pavel et al., 2003). By 1999, “DTEP had graduated 19 students with bachelor’s degrees” and “all received job offers before or just after graduation” (Pavel et al., 2003, p. 200). In 2000, the Northwest Indian College campus on the Lummi Indian Reservation in cooperation with Washington State University graduated six students with B.A. degrees in elementary education.

Similarly, the teacher education program at Turtle Mountain Community College, which serves the Turtle Mountain Band of Chippewa, “reflects holistic and integrative methodologies, fluid disciplinary boundaries, integrative technologies, and culturally adapted courses grounded in the ancient, holistic spirit of the native culture” (Pavel et al., 2003, p. 203). Leech Lake Tribal College in collaboration with Sinte Gleska University, another TCU, has implemented highly successful four-year teacher-training project consisting of (a) required courses in general education, (b) required courses in

Anishinaabe studies, (c) content and methods courses specific to elementary education, (d) courses specific to an area of concentration, (e) a number of professional education courses and student teaching (Pavel et al., 2003). Courses are delivered “using a mix of traditional classroom courses, interactive television, flexible scheduling, internship opportunities, and Internet classes at partnering schools” (p. 205).

Not all is well, however. According to O’Donnell et al. (2003), there is a digital divide among American Indians caused by a lack of infrastructure and American Indian computer specialists. Salish Kootenai College conducted a survey from 2000 to 2003 to ascertain the “status of tribal computer technology and the need for college courses and degree programs of study delivered via the Internet” (O’Donnell et al., 2003, p. 260). The results overwhelmingly pointed to dire information technology (IT) needs including training and coursework:

Preliminary data on tribal needs for higher education show an interest in asynchronous (Internet) bachelor’s and associate degree program of study. Data on tribal needs for college courses and degree programs of study delivered via the Internet include the following: (a) of 551 tribes, 281 selected bachelor’s degree programs of environmental science, tribal human services, nursing, education, and business; and (b) of 551 tribes, 249 selected asocial degree programs of study in 17 areas including health science, health records technology, chemical dependence counseling, office education, fisheries, forestry, computer science, tribal government, nursing, early childhood education, dental assisting, paralegal, engineering, food services, accounting, math, and English (O’Donnell et al., 2003, p. 260).

With the help of the W.K. Kellogg Foundation’s Native American Higher Education Initiative, however, nine projects were designed to improve instructional technology on TCU campuses. According to O’Donnell et al. (2003):

Candeska Cikana Community College completed its college website and local area network, and developed an online course. Lac Courte Oreilles Ojibwa Community College helped other tribal colleges use IT to access resources at mainstream universities. Little Big Horn College added new software to improve its management information system. Salish Kootenai College conducted a distance-education needs assessment of Indian tribes in the United States. And Southwestern Indian Polytechnic Institute improved student access to agricultural technology programs (p. 263).

This new period of cultural resistance and expansion, therefore, reflects more than simply a search for culturally-sensitive education, as Almeida (1997) pointed out, but a search within the context of technological needs for American Indians. This period is also characterized by other challenges, which form the bases for the remaining sections in this chapter.

Access and Persistence of American Indian College Students

In this section, I summarize the research on American Indians in higher education in the US. I focus first on statistical information, and then move into a discussion of the research on persistence and retention. This research suggests the need for TCUs, which becomes the subject of the following section.

Current American Indian Demographics

As of 2003, there were 4.4 million American Indians/Alaska Natives (“AI/ANs”) in the US, representing 1.5% of the total population (Freeman & Fox, 2005). Currently, there are 562 federally-recognized tribes, 33 state-recognized tribes, and 245 unrecognized tribes. In 2000, the states with the largest percentage of AI/ANs were Alaska, Oklahoma, and New Mexico (U.S. Census Bureau, 2000). The most populated reservation was the Navajo Nation Reservation and Off-Reservation, with 175,228 residents (U.S. Census Bureau, 2000). The percentage distribution of American Indians/Alaska Natives by US region goes as follows: the West (43%); the Midwest (17.4%), the North (9.1%), and the South (30.6%) (U.S. Census Bureau, 2000). AI/ANs have higher rates of poverty than Whites, and AI/ANs who live on reservations have higher rates of poverty than those that do not live on reservations (Freeman & Fox, 2005).

AI/ANs between the ages of 18–24 in 2003 “were less likely to be enrolled in a college or university than their White, Asian/Pacific, Black peers” (Freeman & Fox, 2005, p. 98). About 16,000 AI/ANs attend Tribal Colleges and Universities (TCUs). Most of these students at TCUs are over 24 years old, and over half are single parents (Freeman & Fox). During the 1999–2000 school year, “56 percent American Indians/Alaska Natives received financial aid” (Freeman & Fox, 2005, p. 104). Sixty-four percent of the students at TCUs are women (Martin, 2005, p. 81). Overall, American Indians/Alaska Natives were less likely to earn a bachelor’s degree than their peers. In 2002–2003, 9,803 bachelor’s degrees were awarded to American Indians/Alaska Natives (Freeman & Fox, 2005). Most AI/ANs major in business followed by social sciences/history and education (Freeman & Fox, 2005). The overall attrition rate for American Indians is 56% (Yang et al., 2006, p. 35). Attrition rates for American Indians in the Southwest range from 75% to 85% at four-year institutions (Pewewardy & Frey, 2004).

These figures suggest the necessity of TCUs. According to Martin (2005), “despite the high risk factors of many tribal college students, 86 percent persist to complete a degree” (p. 81). Additionally, “after attending tribal colleges, the persistence rates for American Indian students at mainstream institutions are four times the rate of those for American Indian students who have never attended a tribal college” (p. 81). Martin acknowledges several factors inherent at TCUs that help American Indian students persist:

Tribal colleges have greater success with American Indian students because they recognize the importance of individual attention, offer programs that are culturally sensitive, and have learned that family support services are integral to their students’ progress and success. Tribal colleges understand the importance of the student’s role within his or her cultural, family, and community context (p. 81).

This is contrary to what happens to American Indians in mainstream institutions. In Lowe’s (2005) study of American Indian students’ stories about their experiences attending college, she found that most American Indian students are culturally “shocked” because of their new surroundings. For example, one student who had

started at Princeton believed she did not fit into the “existing social structure” and felt “miserable and depressed” (p. 36). She persisted but stated, “Princeton has beaten me. Princeton has made me cry. Princeton has made me feel alone” (p. 36).

In his ethnographic study of two American Indian graduates of two Ivy League institutions, Brayboy (2005) describes the cultural give-and-take that allowed these two students to graduate from White-dominant cultural environments. Heather and John’s (the two participants in Brayboy’s study) strategies for survival while at their respective colleges included “strategies of both accommodation and resistance to manage structural barriers in order to be academically successful” (p. 202). Heather succeeded by being a “good Indian” and a “good student” in a strategic place. Namely, she interacted with her professors outside of class in her own private space “to highlight what she knows without having to ‘perform’ in a manner consistent with the norms of the dominant institution” (p. 203). John’s strategies of survival at his institution consisted of finding faculty who were interested in working with him in independent studies to connect his “knowledge and acquisition of specific skills as they relate to empowerment” (p. 204), and particularly “to use theory and language to show white people that [American Indians] know how to read and write and win” (pp. 203–204).

As with the demographic studies, studies on the experiences of American Indians in historically White institutions imply the need for TCUs. In general, persistence is higher at TCUs among American Indian students because they attempt to meet the specific linguistic, cultural, and familial needs of these students unlike in mainstream institutions. Before laying this argument out more fully, it is important to discuss the research on persistence and retention. As the studies described below on access and persistence demonstrate, when American Indians attend a TCU and then attend a mainstream institution, their persistence rates will be significantly higher than not having attended a TCU prior to enrollment.

American Indian Access and Persistence

Even though the demographics describe above indicate that American Indians graduate from high school at the same rates as other ethnic minorities in the US, they have high rates of attrition. Attrition rates for American Indians “range from between 75 percent to 95 percent” (Larimore & McClellan, 2005, p. 17). Oddly enough, American Indians “have recently been admitted to college in such high numbers that they are slightly overrepresented in initial enrollments in college”(Jackson et al., 2003).

In his seminal study, *An Anthropological Analysis of Student Participation in College* (2002), Tierney criticizes Tinto’s model of student retention for misinterpreting “the anthropological notions of ritual” (p. 603). His specific example is the experiences of American Indian students’ experiences in mainstream institutions. Specifically, Tierney argues that the problems pertain to “a misinterpretation of the cultural definition of ritual,” and “overreliance on an integrative framework”

(p. 607). The first problem is that Tinto's social integrationist theory decontextualizes the notion of ritual and essentially represents it in terms of the White dominant culture (p. 608). Administrators may often indicate that American Indians do not "acculturate" to the campus while not acknowledging the possibility that students' tribal cultures had any value in themselves. The second problem with Tinto's theory, according to Tierney, is that it relies upon terms like "departure," "failure," or "dropout" when such terms do not exist in "traditional cultural rites of passage." These terms assume that the fault lies with the student, who then becomes the "problem" (p. 615).

Tierney also identifies two other problems with Tinto's theory of retention. One, Tinto focuses only individual integration while ignoring "cultural formations or groups." This assumes, then, that if the students do not break ties with their tribal cultures, they cannot individually "achieve" and succeed in mainstream institutions (p. 615). Second, Tinto never explains in his theory that his perceptions as a "native studying native rituals" are "provisional, subjective, and never complete" (p. 611). Blind adherence of such notions for American Indians will prevent institutions from recognizing that they themselves, not the students, might be the problem leading to the students' poor retention (p. 615).

Since Tierney's study, there have been a few other studies focusing on American Indians' access and retention from the point of view of American Indian students. For example, in their qualitative study of 15 American Indian college seniors who had previously lived on reservations and who now attended a Predominantly White Institution (PWI), Jackson et al. (2003) asked these students what led them to persist at PWI. For these authors, American Indian persistence is divided into three categories: (a) sociocultural factors, (b) academic factors, and (c) personal factors. Sociocultural factors include perceptions by American Indians that White campuses are "hostile towards them, [and have a] lack of American Indian cultural accommodation on campus, family encouragement, and faculty interactions" (p. 549). Academic factors include the lack of high-school preparation in study skills and college preparation courses; the lack of adequate high-school counselor guidance regarding postsecondary planning and career development; and the lack of college career development preparation. Personal factors that affect persistence include perception of academic confidence and competence, achievement motivation, family and institutional financial support, delayed enrollment, part-time attendance, working full-time, being a single parent, and being a GED recipient.

In short, Jackson et al.'s found that the most important factors in American Indian persistence included family encouragement, structured social support, faculty and staff "warmth," exposure to college experiences and possible vocations such as Upward Bound, developed independence and assertiveness when it comes to asking for academic help, reliance on spiritual resources as way to maintain culture and source of support, coping with racism on campus, comfort and acceptance of having attended several colleges or having a nonlinear path to college and taking longer to graduate, and being able to reconcile paradoxical pressure to do well in college and maintain cultural identity.

Jackson et al. (2003) also make some important recommendations. First, they argue that while the paradoxical pressure of attending college and maintaining cultural identity is being experienced at the family level, it is also being dealt with at the community and tribal levels, so that students feel that they are getting full support. Second, the authors also argue that it is important to “align” students’ spiritual practices and college strategies to “minimize the conflict between college success and maintaining cultural identity” (p. 561). Third, they also suggest that an advisement dialogue needs to be established prior to and at college and must include “discussions of loneliness, negative peer pressure, and the risks of acculturation and bicultural identity—especially racism” (p. 561). Fourth, support programs for American Indians, according to the researchers, are also important and should perhaps be mandatory since American Indian students have a “collectivist approach to education” (p. 562). According to the researchers, mentors should be incorporated into the support programs for American Indians because they would mitigate the negative influences of friends, especially when it comes to academic success. Finally, Jackson, Smith, and Hill recommend that personal relationships between faculty and staff members be developed early since their interviewees indicated that these relationships helped them while in college (p. 562–563).

In a comparative study, Pewewardy and Frey (2004) studied the perceptions among American Indian and White college students relating to racial dynamics, student support services, cultural diversity perceptions, and ethnic fraud (i.e., “misrepresenting one’s ethnic identity in order to gain financial aid or other benefits”) at a predominantly White institution (“PWI”). They found that American Indians perceive the campus climate at PWI to be negative, but that American Indians strongly believed in the value of institutional support, support services, and multicultural curricula. When it comes to motivation to succeed, American Indians were more likely than Whites to believe that “ethnic minorities are not as motivated to succeed as Whites” (p. 47). Pewewardy and Frey explain that these American Indian college students have adopted White (racist) views of regarding race. For example, while American Indian students “rejected notions of ethnic superiority,” “they were more likely to endorse statements that ‘in general, African Americans are generally inferior to White Americans’ and ‘in general, Whites are genetically inferior to Asians’ than their White counterparts” (p. 46).

Pewewardy and Frey (2004) offer recommendations for improving the retention and success of American Indian students at PWIs. Their first recommendation is for institutions to diversify the mostly “White and middle class” faculty at PWIs because of the dissonance in mores, customs, and values between them and American Indian college students. Second, they also recommend strengthening support services for American Indians at PWIs, which only recently have begun to take hold. Finally, Pewewardy and Frey (2004) recommend that since American Indians at PWIs face hostile climates that institutions “need to gain more than just superficial/stereotypical knowledge and experience with regard to cultural diversity, because insufficient knowledge and contact appear to be correlated with high levels of prejudice” (p. 50).

In their survey study, Yang et al. (2006) observed that American Indians at PWIs who “felt less directed and more adrift” and who had lower GPA’s used the

student support office more frequently. They also found that those American Indians that used the office less often were those that had issues relating to their “culture-of-origin” (p. 45). Two specific types of American Indian students who did not use the student support office were (1) those in “poor health, alienated, and self-exiled,” and (2) those that felt “adrift at sea” because [they] feel ignored and detached from their valuable past (p. 45).

Yang et al. concluded that while the student support office does help some American Indians, it does not help others. They argued that this is due to American Indians being both welcomed and ignored when they come to a PWI. This “paradoxical encounter,” the researchers indicate, is caused by “the opposition between their familial values (e.g., contributing to collective pride and not seeking personal aggrandizement) and campus values (e.g., public recognition through individual competition)” (p. 45). The researchers recommend different types of recruiting strategies for American Indians/Alaska Natives. For those in poor health and those who feel alienated, the researchers recommend that active recruitment by the student support office is warranted since a request for help “might not come.” For the second type of American Indians/Alaska Natives student, contact should be made by another student and not a representative from the student support office. Since American Indians/Alaska Natives students “are approachable outside the contexts of ethnic identity,” topics initiated by the contact student should be based on topics that affect all students, such as course-work (e.g., specific classes, selecting a major), interaction with faculty, or on- and off-campus life generally (p. 46).

Austin’s (2005) study moves away from student perceptions and argues that even though “American Indians have been studying at the colleges and universities in this country for 350 years now ... key people at these institutions—administrators, student services staff, and faculty—can claim no more than exiguous knowledge of about the American Indian students on their campuses” (p. 41). Austin, therefore, underlines four major expectations that tribal leaders and parents have of higher education relating to (1) tribal legal status, (2) support for American Indian college students, (3) cooperative relationships between universities and American Indian college students, and (4) respect for American Indian cultures and languages. I will summarize these in order.

Tribal legal status is the status between tribal-affiliated American Indians and the US government. This status is based on a sovereign relationship, just as the federal and state governments in the US are sovereign (Austin, 2005). This state-to-state relationship between the federal government and American Indian tribes merits awareness to “help key college and university officials better understand their American Indian students, the students’ tribes, and the responsibilities the universities have assumed by admitting American Indian students” (Austin, 2005, p. 42).

From the American Indian parents’ perspective, support for American Indian students must include a residence wing for freshmen and sophomore American Indian students, pre-collegiate orientation and socials to make connections, group registration, and providing mentors and tutors who are American Indian (Austin, 2005). Working with American Indian Studies programs and connecting American Indian faculty and staff with American Indian students are also important factors

that American Indian parents expect from institutions of higher education. Tribal leaders “want American Indian students to soak up Western knowledge, place that knowledge within the context of their cultures and languages, and return home to better communities” (Austin, 2005, p. 43).

Cooperative relationships between tribal communities and college institutions can stem from these tribal communities’ needs to solve “social, health, or economic problems that require specialized inquiry” (Austin, 2005, p. 44). Additionally, because tribes seriously need American Indians receiving degrees in the fields of law, medicine, business, American Indian language and culture preservation, agriculture, education, health, engineering, administration, and management, colleges and universities need to work together with tribal leaders to determine each tribes’ specific needs. Mainstream colleges and universities can also work together with TCUs to provide distance education to rural and remote American Indian tribes which sorely need it (Austin, 2005).

Finally, parents and tribal leaders expect that colleges and universities “demonstrate that American Indians matter by offering courses on American Indian history, cultures, and languages; encouraging internships with tribal governments and communities; inviting American Indian leaders and elders as speakers; and promoting faculty and student exchange programs with tribal colleges” (Austin, 2005, p. 47).

Given these expectations and the difficulties American Indians face at PWIs, the need for TCUs becomes clear. As Austin states, TCUs “have worked miracles in American Indian higher education” (p. 46). TCUs are unique because they have significant strategies for retaining American Indian students that mainstream colleges and universities do not (but could use), and they are “committed to preserving and revitalizing American Indian cultures and languages” (Austin, 2005, p. 46).

The Necessity of Tribal Colleges and Universities

In this section, I provide a brief history of TCUs. I then argue for their continued support. Much has been written about TCUs from a historical perspective, so here I provide only a very general and very brief history. The primary purpose of the section, however, is to argue for the necessity of TCUs.

Brief History of TCUs

As I indicated before, the first TCU was established in 1968. Surprisingly enough, there was an attempt to establish the first American Indian university in 1861. C.C. Hutchinson “worked with a member of the American Baptist Home Mission to charter Roger Williams University in Ottawa, Kansas (renamed Ottawa University in 1865), with the help of prominent Baptists” (Reyhner & Eder, 2004, p. 290–291). However, Hutchinson was suspended as an Indian agent for not keeping adequate

financial records. By 1872, Ottawa University had only one Indian student, so it was later sold. In 1887, the Croatan Normal School (later Pembroke State College) in North Carolina was established with 15 Lumbee Indians (Reyhner & Eder, 2004). Between 1941 and 1953, “when it was opened to non-Indians by court-ordered desegregation in schools, Pembroke was the only four-year state-supported college for Indians in the United States” (Reyhner & Eder, 2004, p. 291). In 1971, Pembroke was subsumed into the University of North Carolina System. In 1890, North Carolina opened another university for American Indians, the Indian University of Tahlequah (later Bacone College). By fall 2001, of the student body at Bacone College, “436 students [were] 45 percent Indian, representing twenty-three tribes” (Reyhner & Eder, 2004, p. 294).

The first tribal college, Navajo Community College (now Diné College), was established in 1968. Today there are 31 Tribal Colleges and Universities (TCUs) in 12 states mainly concentrated in the western part of the US on or near impoverished American Indian reservations. As of 2002, there were 16,000 students enrolled in TCUs, 82% of whom are American Indians and Alaska Natives (NCES, 2005, p. 100–102). The idea for TCUs emerged during the Contemporary Resistance Era (see Almeida, 1997) when American Indians began to focus on “self-determination” (American Higher Education Consortium, 1999). Specifically, TCUs were “developed in response to the lack of access to higher education for American Indian people, and the low rate of success American Indians were experiencing in mainstream institutions” (Brown, 2003, p. 36). For example, in 1957 the Navajo tribe established a scholarship fund financed by oil royalties to send their high school graduates to mainstream colleges, but “more than 50 percent of the students dropped out in their freshmen year” (Reyhner & Eder, 2004, pp. 295–296).

TCUs were also developed to serve the economic needs of American Indian college students who live on poor reservations (Fogarty, 2007, p. 13). In the late 1960s, American Indian “leaders recognized the growing importance of postsecondary education, and became convinced that it could strengthen reservations and tribal culture without assimilation” (American Higher Education Consortium, 1999, A-2). These leaders also “understood that possession of mainstream (American) literacy was essential to their participation in this imperfect market-advantaged society” (Benham, 2004, p. 3). Some of the TCUs were established in cooperation with mainstream higher education institutions. For example, “from the conception of Navajo Community College [now Diné College], the first tribal college, to present-day operations, ASU constituents were involved in discussions with Diné College staff” (Brown, 2003, p. 36). However, other newly formed TCUs were questioned by mainstream education officials as whether they were really necessary (Brown, 2003).

In 1972, the presidents of six of the first TCUs established the American Indian Higher Education Consortium (AIHEC). Today it represents 31 colleges in the US and one college in Canada (American Higher Education Consortium, 1999). Its mission statement indicates that its purpose is to “maintain commonly held standards of quality in American Indian education; assure participation in the foundation and administration of educational legislation,

policy, rules, regulations, and budgets; assist Tribal Colleges in establishing a secure financial base; and encourage greater participation by American Indians in the development of higher education policy” (American Higher Education Consortium, 1999, A-3).

With help from many supporters, such as the National Congress of American Indians, the National Tribal Chairmen’s Association, the National American Indian Association, and the Western Interstate Commission of Higher Education’s (WICHE) Patricia Locke, AIHEC ensured that the Tribally Controlled Community Assistance Act was passed, and this eventually prevented the TCUs from closing because of a lack of funds and actually led to their eventual financial stabilization. AIHEC’s leadership also led to legislation designating TCUs in 1994 as land-grant institutions, allowing them to receive further federal funds (Reyhner & Eder, 2004).

In 1989, American Indian college presidents established the *American Indian College Fund* (“the Fund”) to raise private-sector funds for qualified scholarships to American Indians who are attending TCUs (American Indian College Fund, no date). The Fund currently disburses about 5,000 scholarships annually to American Indian TCU students as well as funding for capital support and cultural preservation (American Indian College Fund, no date). With this brief history out of the way, we can now proceed to the reasons why they should exist.

The Mission and Value of TCUs

TCUs emerged after a violent history associated with colonization in the Americas, and they continue to serve distinct American Indian tribal populations in different states. Despite differences associated with particular tribal cultures, they have the following important similarities:

- (1) most are less than 25 years old;
- (2) most have relatively small student bodies that are mainly American Indian;
- (3) most are located on remote reservations, with limited access to other colleges;
- (4) most were chartered by one or more tribes, but maintain their distance from tribal governments;
- (5) all have open admissions policies; and
- (6) all began as two-year institutions (American Indian Higher Education Consortium, 1999)

While some may argue that TCUs are little more than community colleges, they are in fact very different from traditional colleges, two- and four-year, because of their “dual mission to (1) rebuild, reinforce, and explore traditional tribal cultures, using uniquely designed curricula and institutional settings; and, at the same time, (2) address Western models of learning and providing traditional disciplinary courses that are transferable to four-year institutions” (American Indian Higher Education Consortium, 1999).

Since most of the TCUs are at or near heavily-impooverished American Indian reservations and communities, their curricula are geared to serving these communities. Thus, TCU curricula respond specifically to community needs, empower communities, preserve and revitalize Native language and culture, and facilitate community healing (Pavel et al., 2001). In many instances, all four of these goals are intertwined. For example, at Fort Peck Community College in Montana, according to Barden (2003), a project called the Family Education Model is being put to work in improving communities. This model is based on the belief that the social conditions that inhibit economic development are the same ones that make things difficult for college students, and thus, “the project focuses on four areas; family life skills, family cultural activities [which includes strengthening tribal language skills], family-based mentoring, and student/family counseling” (p. 105).

HeavyRunner and DeCelles (2002) report that the unique Family Education Model (FEM) described above is highly effective when it comes to American Indian college student retention at TCUs. FEM was created in 1997 by American Indian educators, social work professionals, and university advisors from four participating TCUs, Fort Peck Community College, Stone Child College, Salish Kootenai College, Blackfeet Community College, as well as the University of Montana’s Department of Social Work. According to HeavyRunner and DeCelles, FEM was developed with three assumptions in mind:

- a) many students and their families need the college to act as their liaison with existing social and health services during times of crisis; b) tribal colleges must seek to enlist, develop, and structure the ability of family members to support student efforts; and c) tribal colleges must engage family members in the life of the college community by enlisting them as partners and involving them in cultural and social activities (p. 31).

In essence, “the model shifts the paradigm from a focus on drop-outs to a family-centered approach, building on student and family strengths” (Ortiz & HeavyRunner, 2003, p. 229). Specific FEM strategies include: (1) involving students’ families in cultural activities; (2) the faculty initiated Search and Rescue Team, “a form of intrusive monitoring, when students appear at-risk for leaving college”; and (3) teaching family life skills, such as resource management, decision-making skills, communication skills, conflict resolution, parenting skills, anger management, and so forth (Ortiz & HeavyRunner, 2003, p. 229–230).

In their study on American Indian culture and language in school and college curricula, Benham and Mann (2003) find that current American Indian language immersion initiatives must provide “a native epistemological model that defines native/indigenous worldviews of ways of being and regarding knowing” (p. 173). Based on the National American Higher Education Initiative (NAHEI), a language-immersion program, Benham and Mann find three key principles that must be included in such language-immersion programs. First, there must be learning that leads to sovereignty, engagement, and empowerment begins with an individual’s spiritual and cultural, emotional, and physical, and cognitive strength and self-esteem. Second, An individual’s learning must embrace interrelated disciplines, including the humanities, professions, social sciences, and natural sciences; thereby, learning in balanced, equitable, and develops high ethical standards in

natives for living in a contemporary world. Last, the learner, with a strong inner core, can then be challenged to design solutions or actions that address social, political, cultural, and economic issues that affect wellness, the family and tribe/clans, and the land, water, and natural resources that sustain life (p. 173).

Specific policies necessary for TCUs based on the above principles include, according to Benham and Mann, (1) a requirement that TCUs have an active and productive native/indigenous language and culture department; (2) policies requiring all students to take at a minimum, conversational native language courses; (3) an assurance that “culturally appropriate” curricula will support native language, culture, epistemologies, and pedagogies; (4) a strong collaborative efforts between pre-collegiate and postsecondary institutions; (5) an encouragement of the AIHEC to require that tribal colleges/native controlled institutions both individually and collectively define and support efforts that recruit native/indigenous educators and to integrate first-language instruction in formal and informal postsecondary teaching experiences; (6) a promotion of intergenerational research; (7) the continuation of efforts to finance these policies and practices through a variety of federal and non-federal funding; and, finally, (8) the necessity of having native and non-native scholars study issues of language and “cultural transference without the mother tongue” (p. 189).

Given such models, research on the access and persistence of American Indians and Alaska Natives at TCUs has consistently demonstrated that these students succeed in four-year institutions if they first attended a two-year TCU. TCUs serve as a backup plan for American Indians who normally would not attend mainstream colleges or for those who went and were not accustomed to the culture (Boyer, 2004). In her study of transfer college students at the University of North Dakota, Brown (2003) found that American Indian students highly recommend to other American Indian college students to attend a TCU before transferring to a four-year mainstream education because of geographic proximity, the supportive atmosphere, particularly from faculty, and cultural empowerment. Given this, it is important not only to support TCUs, but to extend their reach beyond their walls.

Extending the Reach of TCUs

One way to extend the reach of TCUs is to support partnerships with mainstream institutions. In their study on TCU and state-university collaboration, Nichols and Kayongo-Male (2003) found seven specific factors that led to successful partnerships between these two types of institutions. These included contextual factors, motivation, individual factors, organizational factors, collaboration, empowerment, and outcomes. Contextual factors consisted of historical, social, political, and economic factors. The three themes that emerged with regard to contextual factors included “baggage,” “complication,” and “trust” (pp. 12–13). “Baggage” referred to the burdens that collaboration can bring. “Complication” meant the complexities of collaborating with regard to a number of American Indian issues, such as

poverty, politics, and “cultural stuff” (p. 12). “Trust” related to the specific historical issues relating to broken treaties, removal, and so forth. Motivation, individual, and organizational factors included “survival, access to resources, a sense of inner responsibility, expanded opportunities for personal and professional growth, and empathy for the underserved” (p. 14). Collaboration and empowerment factors included “responsiveness, respect for partners, resource partnerships, academic neutrality, coordination, and integration” (p. 16). Outcomes resulted in “new joint degree programs, faculty development, and numerous student success stories” (p. 17).

Premised on similar ideas, Nichols and Monette (2003) described three specific successful collaborative efforts between TCUs and mainstream institutions. The first one is Project Hoop at Sinte Gleska University and the University of California, Los Angeles (Honoring Our Origins and People), which “combines academic and artistic program delivery in native theater with community cultural development” (p. 130). The Project is “totally culturally based and, moreover, is grounded in a community-based model approach” (p. 131). For example, in 2001, they report that staff was working with local Indian Health Service personnel to raise awareness about diabetes by having drama majors produce a video on diabetes for use as a teaching tool with community members.

Similarly, Leech Lake Tribal College, Sinte Gleska University, and Bemidji State University have collaborated to “increase student enrollment and improve retention at Leech Lake Tribal College and Bemidji State University by developing opportunities for students to complete four-year degrees on site at the distance TCU” (Nichols & Monette, 2003, p. 131). Since the partnership Bemidji State University’s enrollment has increased by 38%, a “200% increase in Leech Lake Tribal College degreed students enrolled at Bemidji State and a 300% increase in the Leech Lake Tribal College students earning baccalaureate degrees in 1998 to 1999” (p. 132). “The OKSALE Teacher Education Program between Northwest Indian College and Washington State University has resulted in Washington State’s receipt of a \$10 million, five-year grant from the US Department of Education to provide adequate American Indian teacher training and for training and technical assistance to public school staff and teachers” (p. 132). According to Nichols and Monette, the specific lessons from these models are, first, contractual agreements must explicitly indicate the expectations and responsibilities of each partner; second, shared decision-making between institutions is essential; three, each partner’s interests must be protected; and last, successful partnerships evolve over time.

Of course, such partnerships are not always possible, but nevertheless the reach of TCUs can be extended *conceptually*, that is, their logic can be extended to mainstream institutions. For example, Martin (2005) recommends that if mainstream institutions are to help American Indian students persist, they should “replicate” TCUs’ support programs. He recommends particularly that postsecondary institutions should enter into K-16 partnerships with tribal communities to improve preparation and orientation for college. Specifically, he argues, “summer bridge and orientation programs are examples that may assist

students with social and academic integration” (p. 84). He also recommends that mainstream colleges be “more family friendly” such as organizing family events once or twice a year and providing technology to maintain communication linkages between students and family members (e.g., email, interactive video, newsletters). Additionally, colleges should have child care programs in place to assist students who have children. Another recommendation Martin makes is for colleges to “incorporate American Indian culture into courses, programs, and architecture and landscape on campus” (p. 85). One example of this, per Martin, is for colleges to build “a fire circle, which is a circle of stones with a fire in the middle” so that students can use it to “pray according to their own tribal beliefs” (p. 85).

Another example of such culturally-sensitive curricular programs is the Ojibwe language program at the Michigan State University (MSU). According to Morgan (2005), when Ojibwe language courses started to be offered at MSU, other Ojibwe events began to take place on campus that began to bridge the university with the local American Indian tribe:

The events also create new and alternative spaces for learning and using Ojibwe that are necessary given the local speaking environment. Importantly, the university-based language events break down the traditional boundaries of classroom learning by making language learning more accessible. Because of the historic treatment of Indigenous languages within large universities and lack of participation from local Indigenous communities, this transparency is critical for the success of current language programs (p. 101).

In line with what I discussed previously, Martin (2005) suggests that “institutions that are geographically close to American Indian communities could form partnerships with tribal colleges and leaders in developing culturally sensitive programming. Finally, mainstream institutions “should earmark additional financial aid and scholarship support to assist in meeting the unmet financial need of American Indian students” (Martin, 2005, p. 85).

Lowe (2005) has similar recommendations for student affairs professionals at mainstream institutions with American Indian students. First, student affairs professionals should work with American Indian student prior to their arrival at the campus so that they are aware of resources available to them. Second, she recommends that they orient students to the different array of programs and services on campus, such as the bookstore and the financial aid office, so that that American Indian students are aware of the college as a “campus and as a system” (p. 37). Student affairs professionals should also make American Indian students feel they are part of the university family, especially since they are far away from their own families. Students should feel that they belong; and so these programs and services should include American Indian faculty and staff.

It is not enough to focus on students. The institution’s staff should also be aware of any community services available for American Indian students. They should be trained to be readily provide to help and to be proactive with regard to any problems that American Indian students encounter (Lowe, 2005). American Indian students come from different backgrounds and experiences, so the college staff should treat

them as individuals. Staff should also be aware of American Indian ways of knowing. For example, according to Cajete (2005), a number of elements characterize indigenous and processes, including:

- (a) the sacred view that Nature permeates and contextualizes the foundational processes of teaching and learning;
- (b) integration and interconnectedness are universal traits;
- (c) relationships between elements and knowledge bases radiate in concentric rings of process and structure’
- (d) its processes adhere to the principles of reciprocity between humans and all other things; and
- (e) it recognizes and incorporates the cycles within cycles, that is, that there are always deeper levels of meaning to be found in every learning-teaching process (p. 70).

In other words, colleges and universities must support American Indian students’ identities (Lowe, 2005). They should help students focus on schoolwork and classes, of course, but, additionally, institutions should focus on American Indian students’ strengths. American Indian students need to be treated as being able to succeed. Finally, staff, faculty, researchers, and administrators need to do more research on American Indian college student experiences to determine if institutional programs are helping them succeed (Lowe, 2005).

Conclusion

While the last decade or so has seen a growth of research on American Indian students, much work is still to be done. For example, one line of research which needs to be done is why still there are no TCUs in the Northeast or Southeast when each of these areas represent 9.1% and 30.6% of the American Indian population in the US, respectively (U.S. Census Bureau, 2000). Is this due to lack of funding, politics, or tribal boundaries? Additionally, more research needs to be done on American Indian college support programs at mainstream institutions to determine if these programs are working at all, and if they are following the lead of TCUs with regard to successful retention programs. Another issue warranting more research is the role of mainstream institutions with regard to indigenous epistemologies and pedagogies. Do the non-Indigenous aspects of the curricula contradict Indigenous culture and ways of knowing?

This raises the question about the validity of research addressing these issues. The predominant research lenses in higher education are “Westernized,” which would treat American Indians as “specimens, not as humans” (Smith, 2001, p. 56). The Western research approach “still conveys a sense of superiority and an overabundance of desire to bring progress into the lives of indigenous peoples—spiritually, intellectually, socially, and economically,” as if indigenous knowledge never existed at all (Smith, 2001, p. 56). For example, when it comes to access and per-

sistence, American Indians are viewed as “specimens” that have a “problem,” “lack motivation,” or have entrenched “cultural differences,” instead of, at least, emphasizing successful programming and cases where American Indian students are succeeding, and, at most, questioning the assumptions of cultural dominance underlying such categories.

Using the example of how the Maori in New Zealand began to undertake their own research about their culture, Smith (2001) provides several examples of how American Indians around the world can “decolonize” themselves as the researched, and instead start researching their own lives. They must determine their own research needs and priorities; they must define how research should proceed; they must train American Indian researchers; they must discuss culturally appropriate ethics; they must develop culturally sympathetic models; they must collaborate with indigenous tribes and similar communities; they must disseminate Indigenous research; they must critique community of indigenous researchers; they must open the boundaries for Indigenous research in indigenous fields and disciplines; they must educate wider community; and they must be accountable to indigenous peoples (p. 192).

Smith (2001) also argues that non-Indigenous researchers can undertake Indigenous studies as long as it follows one or all of the following culturally appropriate models: (1) authoritative Indigenous people must guide and sponsor the research; (2) researchers must be incorporated into the daily lives of Indigenous peoples which “extends far beyond the realm of research”; (3) researchers must ask for assistance from the Indigenous community to support and develop their research; and (4) the research must address specific questions indigenous peoples “want to know and which has beneficial outcomes” (p. 177).

One recent outcome of Indigenous people conducting the researching about themselves within higher education is the establishment of the *World Indigenous Nations Higher Education Consortium* (WINHEC), established in 2002, which focuses on:

- 1) accelerate the articulation of Indigenous epistemology (ways of knowing, education, philosophy, and research);
- 2) protect and enhance Indigenous spiritual beliefs, culture and languages through higher education;
- 3) advance the social, economical, and political status of Indigenous Peoples that contribute to the well-being of indigenous communities through higher education;
- 4) create an accreditation body for indigenous education initiatives and systems that identify common criteria, practices and principles by which Indigenous Peoples live;
- 5) recognize the significance of Indigenous education;
- 6) create a global network for sharing knowledge through exchange forums and state of the art technology; and
- 7) recognize the educational rights of Indigenous Peoples (World Indigenous Nations Higher Education Consortium, 2007).

To fulfill its mission of supporting Indigenous higher education around the world, WINHEC is currently providing accreditation to postsecondary Indigenous institutions that are committed to indigenous “cultural standards”.

In closing, programs like the ones described above are necessary if American Indians are to control their own higher education needs. As it stands now, the education of American, historically and contemporarily, has been woefully inadequate, to say the least. If the historical oppression of American Indians will end, it must start with edu-

cation, and higher education, in particular, has the potential to further American Indian tribes' own specific cultural and economic needs. But this education cannot proceed from the perspective of the mainstream; it must include culturally-appropriate practices at historically White institutions, and the maintenance and support of Tribal colleges and universities.

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Using Holland's Theory to Study Patterns of College Student Success: The Impact of Major Fields on Students*

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Introduction

For the past ten years or so we have explored the use of the person-environment fit theory of John Holland (1966, 1973, 1985a, 1997) to study the change and stability of abilities, interests and values of college students within their academic disciplines (Smart & Feldman, 1998; Smart et al., 2000, 2006; Feldman et al., 2001; Feldman et al., 1999, 2004). In doing so, we have become increasingly cognizant of the following two properties of Holland's theory: (1) its usefulness in tracking alternative kinds of student success; and (2) the strength of the sociological potentials and implications embedded within it. The present chapter presents a systematic exposition and articulation of these two domains of interest. After presenting a brief overview of Holland's theory, we use the theory to consider new directions for research on college student success. The ensuing discussion focuses on alternative patterns of student success (within major fields), which we illustrate with longitudinal data. We then consider the practical, programmatic and policy implications of our analysis, followed by a comparison of Holland's theory with other contemporary efforts to understand student success.

Overview of Holland's Theory

Holland's theory is one of the most frequently cited contributions to the social science research literature (Citation Classics, 1980) and the validity of its basic tenets is supported by the findings of literally hundreds of studies (Assouline &

* This chapter is based, in part, on a report—commissioned by the National Postsecondary Education Cooperative (NPEC)—we prepared for the 2006 National Symposium on Postsecondary Student Success (held in Washington, DC, November 1–3, 2006). Although the present chapter is different from the earlier report, it has nonetheless benefited from the helpful comments on that report made by various members of the planning committee for the symposium (including the staff of NPEC). We would also like to acknowledge the insightful observations by James C. Hearn in his capacity of consultant to NPEC in its commissioning and production of papers for the symposium.

Meir, 1987; Spokane, 1985; Spokane et al., 2000; Tsabari et al., 2005). Following is a brief exposition of its essential components and fundamental assumptions.

Essential Components

Individual/Psychological Component

Holland's theory assumes that the choice of a vocation or a college major is an expression of personality and that most people can be classified as one of six primary personality types (Realistic, Investigative, Artistic, Social, Enterprising, Conventional). Thorough definitions of the salient attitudes, interests, and competencies of each personality type have been developed over the past four decades by Holland (1966, 1973, 1985a, 1997). For example, Investigative types tend to be critical, intellectual, and reserved, to possess strong mathematical and scientific competencies, and to value scholarly and scientific achievements; while Enterprising types tend to be self-confident, pleasure-seeking, and sociable, to possess strong public speaking and leadership competencies, and to value political and economic achievements. Table 1 presents an illustrative listing of the distinctive attributes of each of the six personality types that constitute the *psychological component* of Holland's theory.

Holland (1997) notes that a variety of qualitative and quantitative methods may be used to assess a person's personality type. Among the *qualitative* methods is the observation of a person's expression of vocational preferences for, or actual employment in, an occupation that is characteristic of a type; or a person's preference for, or actual engagement in, educational training that is characteristic of a type. For example, a person may want to become a chemical engineer, or may currently be employed as a chemical engineer, or plan to major in chemical engineering, or currently be enrolled as a chemical engineering major. Any one of these four kinds of information or combinations of them results in being classified as an Investigative personality type because "chemical engineering" is one of the occupations and academic majors that define the Investigative type. Thus, using the qualitative methods noted by Holland, an individual's personality type is defined by his or her preference for or selection of a particular occupation or academic major that has been shown to be representative of the respective personality types.

Holland and his colleagues have developed a number of resources that may be used to identify occupations and academic majors associated with each personality type. For example, the *Dictionary of Holland Occupational Codes* (DHOC) developed by Gottfredson and Holland (1996), may be used to identify the occupations associated with each personality type. The DHOC classifies all occupations included in the entire *Dictionary of Occupational Titles* (U. S. Department of Labor, 1977) into the six personality types included in Holland's theory. Similarly, *The College Majors Finder* (Rosen et al., 1989) and *The Educational Opportunities Finder* (Rosen et al., 1997) classify over 900 college majors according to their resemblance to the distinctive interests, skills, and abilities of the six personality types and may be used to identify academic majors associated with each personality type.

Table 1 Salient attributes of the six personality types from Holland's theory (Adapted from J. L. Holland, 1977 and G. D. Gottfredson, 1991)

<p>REALISTIC people prefer <i>activities</i> that involve the explicit, ordered, and systematic manipulation of objects, tools, machines, and animals, and avoid educational and interpersonal activities. These behavioral tendencies of Realistic people lead, in turn, to the acquisition of manual, mechanical, agricultural, electrical, and technical <i>competencies</i> and to a deficit in social and educational competencies. Realistic people <i>perceive themselves</i> as practical and conservative, having mechanical, technical, and athletic abilities, and as lacking ability in social skills. They <i>value</i> material rewards—money, power, and status—for tangible accomplishments.</p>
<p>INVESTIGATIVE people prefer <i>activities</i> that involve the observational, symbolic, systematic, and creative investigation of physical, biological, and cultural phenomena in order to understand and control such phenomena, and avoid persuasive, social, and repetitive activities. These behavioral tendencies of Investigative people lead, in turn, to the acquisition of scientific and mathematical <i>competencies</i> and to a deficit in persuasive and leadership abilities. Investigative people <i>perceive themselves</i> as cautious, critical, complex, curious, independent, precise, rational, and scholarly, and <i>value</i> the development or acquisition of knowledge.</p>
<p>ARTISTIC people prefer ambiguous, free, and unsystematized <i>activities</i> that involve the manipulation of physical, verbal, or human materials to create art forms or products, and avoid routine activities and conformity to established rules. These behavioral tendencies of Artistic people lead, in turn, to the acquisition of artistic <i>competencies</i>—language, art, music, drama, writing—and to a deficit in clerical and business system competencies. Artistic people <i>perceive themselves</i> as expressive, original, intuitive, nonconforming, introspective, independent, emotional, and sensitive, and <i>value</i> the creative expression of ideas, emotions, or sentiments.</p>
<p>SOCIAL people prefer <i>activities</i> that involve the manipulation of others to inform, train, develop, cure, or enlighten others, and avoid explicit, ordered, systematic activities involving materials, tools, or machines. These behavioral tendencies of Social people lead, in turn, to the acquisition of human relations <i>competencies</i> (e.g., interpersonal and educational skills) and to a deficit in manual and technical ability. Social people <i>perceive themselves</i> as cooperative, empathetic, generous, helpful, idealistic, responsible, tactful, understanding, and warm, and <i>value</i> fostering the welfare of others and social service.</p>
<p>ENTERPRISING people prefer <i>activities</i> that involve the manipulation of others to attain organizational goals or economic gain, and avoid scientific, intellectual, and abstruse activities. These behavioral tendencies of Enterprising people lead, in turn, to an acquisition of leadership, interpersonal, speaking, and persuasive <i>competencies</i> and to a deficit in scientific ability. Enterprising people <i>perceive themselves</i> as aggressive, ambitious, domineering, energetic, extroverted, optimistic, popular, self-confident, sociable, and talkative, and <i>value</i> material accomplishment and social status.</p>
<p>CONVENTIONAL people prefer <i>activities</i> that involve the explicit, ordered, systematic manipulation of data—such as keeping records, filing and reproducing materials, and organizing written and numerical data according to a prescribed plan—and avoid ambiguous and unstructured undertakings. These behavioral tendencies of Conventional people lead, in turn, to the acquisition of clerical, computational, and business system <i>competencies</i> and to a deficit in artistic competencies. Conventional people <i>perceive themselves</i> as careful, conforming, orderly, and as having clerical and numerical ability. They <i>value</i> material and financial accomplishment and power in social, business, and political arenas.</p>

Among the *quantitative* methods that may be used to assess a person's personality type are scores on selected scales of personality and interest inventories such as the Self-Directed Search (SDS; Holland et al., 1994), the Vocational Preference

Inventory (VPI; Holland, 1985b), the Strong-Campbell Interest Inventory (SCII; Campbell & Hansen, 1981), and the Strong Vocational Interest Blank (SVIB; Campbell & Hansen, 1981). Specifically, the six theme scores of the SCII, the composite activities, competencies, occupations, and self-rating scales from the SDS, and the occupational preference scales of the VPI may be used to assess a person's resemblance to the six personality types.

Although Holland (1997) acknowledges that "no single assessment technique stands out as being the most advantageous for all purposes," he suggests that the use of selected scales of established personality and interest inventories and the use of current preferences for occupations and academic majors "have either produced more coherent results or have special advantages by virtue of their simplicity or theoretical construction" (p. 29). In sum, he suggests that it is preferable to use both inventory and occupational data to determine personality types.

Environmental/Sociological Component

The theory further proposes six analogous model environments reflecting the prevailing physical and social settings in society. That is, for each personality type there is a logically related environment characterized by the atmosphere created by the people who dominate it (e.g., Investigative environments are dominated by Investigative people and foster the development of the distinctive attitudes, interests, values, and competencies of Investigative people; while Enterprising environments are dominated by Enterprising people and foster the development of the distinctive attitudes, interests, values, and competencies of Enterprising people). Table 2 presents an illustrative listing of the distinctive attributes of each of the six model environments that constitute the *sociological component* of Holland's theory.

The distinguishing characteristics of educational and work environments can be discerned in a rather straightforward manner given Holland's (1997) assumption that "many of the psychologically important features of the environment consist of or are transmitted by the people in it" (p. 48). This straightforward manner is known as the Environmental Assessment Technique (EAT), and entails a simple census of the occupations, training preferences, and vocational preferences of individuals who constitute an environment.

The *Dictionary of Holland Occupational Codes* (DHOC) developed by Gottfredson and Holland (1996) may be used to take a census of the distribution of individual personality types in work settings or organizations. The DHOC classifies all occupations included in the entire *Dictionary of Occupational Titles* (U. S. Department of Labor, 1977) into the six personality types included in Holland's theory. Similarly, *The College Majors Finder* (Rosen et al., 1989) and *The Educational Opportunities Finder* (Rosen et al., 1997), which classify over 900 college majors according to their resemblance to the distinctive interests, skills, and abilities of the six personality types, may be used to determine the environmental profiles of educational settings such as colleges and universities.

Table 2 Salient attributes of the six model environments from Holland's theory (Adapted from J. L. Holland, 1997 and G. D. Gottfredson, 1991)

REALISTIC	environments emphasize concrete, practical <i>activities</i> and the use of machines, tools, and materials. These behavioral tendencies of Realistic environments lead, in turn, to the acquisition of mechanical and technical <i>competencies</i> and to a deficit in human relations skills. People in Realistic environments are encouraged to <i>perceive themselves</i> as having practical, productive, and concrete values. Realistic environments <i>reward</i> people for the display of conforming behavior and practical accomplishment.
INVESTIGATIVE	environments emphasize analytical or intellectual <i>activities</i> aimed at the creation and use of knowledge. Such environments devote little attention to persuasive, social, and repetitive activities. These behavioral tendencies in Investigative environments lead, in turn, to the acquisition of analytical, scientific, and mathematical <i>competencies</i> and to a deficit in persuasive and leadership abilities. People in Investigative environments are encouraged to <i>perceive themselves</i> as cautious, critical, complex, curious, independent, precise, rational, and scholarly. Investigative environments <i>reward</i> people for skepticism and persistence in problem solving, documentation of new knowledge, and understanding solutions of common problems.
ARTISTIC	environments emphasize ambiguous, free, and unsystematized <i>activities</i> that involve emotionally expressive interactions with others. These environments devote little attention to explicit, systematic, and ordered activities. These behavioral tendencies in Artistic environments lead, in turn, to the acquisition of innovative and creative <i>competencies</i> —language, art, music, drama, writing—and to a deficit in clerical and business system competencies. People in Artistic environments are encouraged to <i>perceive themselves</i> as having unconventional ideas or manners and possessing aesthetic values. Artistic environments <i>reward</i> people for imagination in literary, artistic, or musical accomplishments.
SOCIAL	environments emphasize <i>activities</i> that involve the mentoring, treating, healing, or teaching of others. These environments devote little attention to explicit, ordered, systematic activities involving materials, tools, or machines. These behavioral tendencies in Social environments lead, in turn, to the acquisition of interpersonal <i>competencies</i> and to a deficit in manual and technical competencies. People in Social environments are encouraged to <i>perceive themselves</i> as cooperative, empathetic, generous, helpful, idealistic, responsible, tactful, understanding, and having concern for the welfare of others. Social environments <i>reward</i> people for the display of empathy, humanitarianism, sociability, and friendliness.
ENTERPRISING	environments emphasize <i>activities</i> that involve the manipulation of others to attain organizational goals or economic gain. These environments devote little attention to observational, symbolic, and systematic activities. These behavioral tendencies in Enterprising environments lead, in turn, to an acquisition of leadership, interpersonal, speaking, and persuasive <i>competencies</i> and to a deficit in scientific competencies. People in Enterprising environments are encouraged to <i>perceive themselves</i> as aggressive, ambitious, domineering, energetic, extroverted, optimistic, popular, self-confident, sociable, and talkative. Enterprising environments <i>reward</i> people for the display of initiative in the pursuit of financial or material accomplishments, dominance, and self-confidence.
CONVENTIONAL	environments emphasize <i>activities</i> that involve the explicit, ordered, systematic manipulation of data to meet predictable organizational demands or specified standards. The behavioral tendencies in Conventional environments lead, in turn, to the acquisition of clerical, computational, and business system <i>competencies</i> necessary to meet precise performance standards and to a deficit in artistic competencies. People in Conventional environments are encouraged to <i>perceive themselves</i> as having a conventional outlook and concern for orderliness and routines. Conventional environments <i>reward</i> people for the display of dependability, conformity, and organizational skills.

In addition to the EAT census approach, Gottfredson and Holland (1991) have developed the Position Classification Inventory (PCI) to classify occupational environments. The PCI, which focuses on environmental demands and rewards rather than on a census of environmental inhabitants, is an 84 item assessment of job requirements, skills, perspectives, values, personal characteristics, talents, and key behaviors commonly performed in a job. This instrument yields a total of nine scales, including estimates of the extent to which an environment resembles each of the six hypothesized environmental models.

Congruence Component

Holland and his colleagues have also defined the “psychological resemblances” among the six personality types and environments and the “fit” or congruence between personality types and model environments through the use of a hexagonal model in which the personality types and environments are arranged on the hexagon in the following clockwise order: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (Holland et al., 1969). The relative similarity of the types and environments is inversely proportional to the distance between any pair in the model (i.e., the shorter the distance between any two environments, the greater their psychological resemblance). In addition, the level of “fit” or congruence between individuals and their environments is inversely proportional to the distance between any pair in the model (i.e., Investigative people in Investigative environments represent a perfect “fit,” Investigative people in Artistic and Realistic environments represent a moderately high level of “fit,” Investigative people in Social and Conventional environments represent a moderately low level of “fit,” while Investigative people in Enterprising environments represents a low level of “fit”). The hexagonal model shown in Fig. 1 represents the *congruence component* of Holland’s theory that reflects the interactions between individuals and their environments.

Fundamental Assumptions

There are three basic assumptions or premises of Holland’s theory, each associated with one of the three components of the theory—individuals, environments, and congruence. The *self-selection assumption* assumes that individuals (e.g., college students) seek to choose occupational and educational environments (e.g., major fields of study) that are compatible with their personality types because such environments afford them with opportunities to take on agreeable roles, to engage in preferred activities, and to respect and reward their values, self-perceptions, and personality traits. The *socialization assumption* is that the model environments (e.g., clusters of academic majors) require, reinforce, and reward individuals for their possession and display of their attitudes, values, interests, and competencies that are consistent with

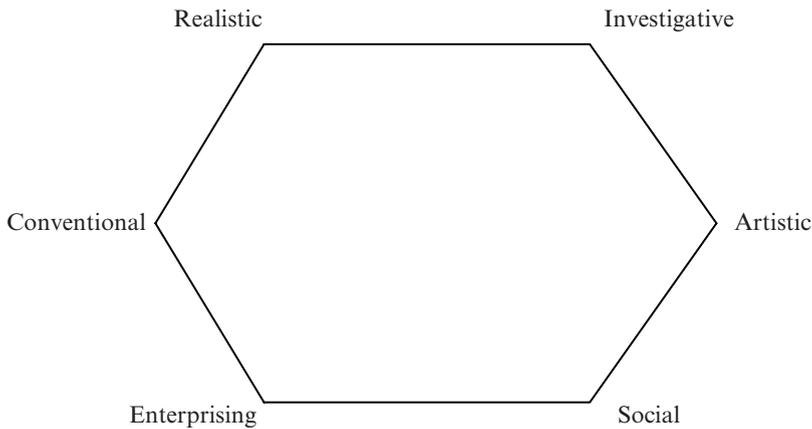


Fig. 1 Hexagonal model for defining psychological resemblances among personality types and academic environments

the attitudes, values, interests, and competencies of the personality types who dominate the respective environments. Finally, the *congruence assumption* suggests that vocational and educational stability, satisfaction, and achievement are a function of the “fit” or congruence between individuals and their environments.

Voluminous empirical evidence generally supports the validity of each of these three fundamental assumptions of Holland's theory, though the amount and strength of the evidence varies across the three assumptions and the respective personality types and model environments (see, for example, Assouline & Meir, 1987; Spokane, 1985; Spokane et al., 2000; Tsabari et al., 2005). The vast majority of this evidence, however, does not appear in the higher education literature, but rather in the psychological literature. We have noted elsewhere, that “whereas Holland's theory has achieved considerable distinction within the broader social science research community ... it has received little attention or use by higher education scholars” as evidenced by the “virtual absence of citations to the theory in such general, mainline higher education journals as the *Journal of Higher Education*, *Research in Higher Education*, *Higher Education*, and *The Review of Higher Education*” (Smart et al., 2000, p. 32).

The lack of attention given to Holland's theory by higher education scholars is regrettable because of its basic success in advancing knowledge of factors associated with vocational stability, satisfaction, and success and its potential to advance our knowledge of factors associated with the persistence, satisfaction, and success of college students. At the same time, this neglect is understandable in that Holland's theory, as advanced initially by a psychologist, is intended primarily to assist individuals in their selection of careers in which they have the greatest likelihood of success, and thus the vast majority of research based on the theory has been conducted by psychologists and has appeared primarily in psychology journals. Although in principle the theory

balances both psychological and sociological components, in practice the psychological (and social psychological) components rather than the sociological components have been emphasized in the research that has been done.

New Directions for Research on Student Success Based on Holland's Theory

This chapter illustrates the direct relevance of Holland's theory to the understanding and enhancement of student success in postsecondary education. Our current efforts are an extension of our previous collaborative studies over the past decade that have led us to see the potential of Holland's theory to understand and enhance student success in a manner that has not emerged from the efforts of other scholars whose research is based on the theory.

Preliminary Considerations: Definition of Selected Terms in Holland's Theory and Patterns of Student Success

As an introduction, we first provide definitions of selected key terms and constructs that are central to Holland's theory and to what we believe is our innovative use of the theory to discern *two distinctive patterns of student success* that flow from alternative hypotheses and assumptions of the theory. These definitions and the associated discussion are intended to serve as "advance organizers" to alert readers to important terms and constructs used throughout the remainder of this chapter.

Students' Initially Prominent Characteristics

This term refers to the defining characteristics of students assigned to each of the six personality types in Holland's theory at the time they enter college. For example, students with a Realistic personality type prefer activities that involve the explicit, ordered, and systematic manipulation of objects, tools, machines, and animals, have strong manual, mechanical, and technical competencies, perceive themselves as practical and conservative, and value material rewards for tangible accomplishments; whereas students with a Social personality type prefer activities that involve the manipulation of people to inform, train, and develop others, have strong interpersonal and human relations competencies, perceive themselves as cooperative, empathetic, helpful, and understanding, and value fostering the development and welfare of others. These unique repertoires of distinctive preferred activities, competencies, self-perceptions, and values of students assigned to each of the personality types in Holland's theory at the time they enter college are what we mean when we refer to students' initially prominent characteristics.

Key Assumptions of Holland's Theory

Of Holland's three major assumptions, two of them are the bases for two alternative patterns of student success in postsecondary education based on what students learn and do not learn as a result of their educational endeavors. The first is the *congruence assumption*, which assumes that student success is a function of the "fit" or congruence between students' personality type and their chosen academic environments (i.e., academic majors). This is the traditional approach that has historically been used by scholars and seeks to determine whether person-environment congruence contributes to student learning in terms of growth in their initially prominent characteristics at the time they entered college. The second is the *socialization assumption*, which assumes that student success is determined by the extent to which students learn the distinctive patterns of attitudes, interests, and abilities that are required, reinforced, and rewarded by their chosen academic environments, irrespective of the "fit" or congruence between students' personality types and their chosen academic environments (i.e., academic majors). The validity of the socialization assumption has received much less attention by scholars who use Holland's theory than the validity of the congruence assumption.

Alternative Patterns of Student Success in Postsecondary Education

Our definition of student success is based on longitudinal patterns of change and stability in the salient attitudes, interests, and abilities of the personality types in academic environments of the theory and the findings that result from reliance on the congruence and socialization assumptions of Holland's theory. Previous research on Holland's theory has focused almost entirely on student success defined in terms of the congruence assumption and the traditional way in which the validity of that assumption has been tested. These collective efforts have resulted in a large body of evidence that supports one definition of student success based on longitudinal change and stability in students' initially prominent characteristics. We, however, pay equal attention to the socialization assumption of Holland's theory, and our attention to this assumption leads us to identify a second pattern of student success that considers not only longitudinal change and stability in students' initially prominent characteristics but also the set of attitudes, interests, and abilities reinforced and rewarded by students' chosen academic environment.

We will show that reliance on these two key or central assumptions leads to two quite different patterns of student success in postsecondary education. The first pattern of student success, based on the congruence assumption of the theory, results in a *more peaked and highly differentiated profile* of student learning in that students grow or enhance their initially prominent characteristics while remaining stable or declining (sometimes substantially) in other repertoires of attitudes, interests, and abilities that are characteristic of other personality types and academic environments. That is, for example, students with a dominant Artistic personality in Artistic fields of study further develop their Artistic attitudes, interests, and abilities, and remain

essentially stable or decline in terms of their Realistic, Investigative, Social, Enterprising, and Conventional attitudes, interests, and abilities. The second pattern of student success, based on the socialization assumption of the theory, results in a *more balanced or less peaked profile* of student learning in that students “grow” in terms of the attitudes, interests, and abilities of their chosen academic environment (academic major)—irrespective of their “fit” or congruence with those environments—even while remaining essentially the same in terms of their initially prominent characteristics. That is, for example, Investigative students who major in an Enterprising academic environment grow in terms of their Enterprising attitudes, interests, and abilities while remaining essentially stable (or declining slightly) in their initially prominent characteristics (i.e., Investigative attitudes, interests, and abilities). Their resulting profile thus is more balanced or less peaked because they have two areas of strength reflected in the repertoire of attitudes, interests, and abilities reinforced and rewarded by their chosen academic environment and their initially prominent characteristics.

Holland’s Theory Revisited

Because Holland’s theory intends to explain vocational behavior, most evidence for the validity of the basic assumptions of the theory has been derived from studies of employed adults. Moreover, attention has been directed primarily to the initial career choices of individuals and the significance of these choices for their subsequent vocational stability, satisfaction, and success. This dominant focus on individuals may be understood as a consequence of the primary focus of the theory itself and the scholarly interests of those who have conducted much of the relevant research. As a theory of careers, Holland’s work is intended primarily to be of assistance to individuals in their search for careers that are satisfying and rewarding, and the research on the theory reflects this orientation toward individuals.

The vast bulk of the research literature in this area concentrates on the validity of the personality types and their searching behaviors (the self-selection assumption) and on the consequences of individuals’ choices of congruent or incongruent vocational environments (the congruence assumption) rather than on the reward and reinforcement patterns of vocational environments (the socialization assumption). Holland (1997) has acknowledged this differential emphasis in the research literature, noting that “the environmental models are only occasionally studied” (p. 160). As Walsh and Holland (1992) have put it: “We view the theory as primarily psychological in nature and one in which the personality variables are the most powerful and influential. ... The theory tends to emphasize person variables and [to be] lean on the concept of reinforcement” (p. 63). Given the psychological orientation of those who have conducted most of the research on the theory, it is not surprising that work environments (in general) and the interpersonal and social structural patterns of environmental reinforcement (in particular) have not been of central interest.

While his theory is intended to explain vocational behavior, Holland has noted repeatedly that the theory and its basic assumptions are equally applicable to educational settings such as college and universities. For example, he notes explicitly that “the hypotheses about educational behaviors ... resemble those for vocational behavior. The choice of, stability in, satisfaction with, and achievement in a field of training or study follow rules *identical* to those outlined for vocational behavior” (Holland, 1997, p. 71, emphasis added). The research evidence supporting the basic assumptions of Holland's theory is sparser as it pertains to college students; even so, two or three dozen relevant studies have been conducted over the past three decades (as reviewed in Smart et al., 2000). While Smart and his colleagues conducted a substantial portion of these earlier studies, interest in Holland's theory is expanding among higher education scholars. The contributions by Umbach and his colleagues on enhancing college students' sensitivity to and appreciation of issues associated with racial and ethnic diversity on campus (e.g., Milem & Umbach, 2003; Milem et al., 2004; Umbach & Milem, 2004; Umbach, 2006), by Porter and Umbach (2006) and Pike (2006a, b) on understanding students' choices of academic majors, by Huang and Healy (1997) on students' work values, by Antony (1998) on entry into medical fields, and by Wolniak and Pascarella's (2005) on the job satisfaction of college graduates are all examples of a growing interest in Holland's theory among higher education scholars. Nonetheless, reliance on Holland's theory in efforts to understand multiple manifestations of student success in post-secondary education still remains the focus of only a limited number of higher education scholars.

Like the studies of employed adults, evidence gained from the educational behaviors of college students reflects an emphasis on assessing separately the validity of each of the three assumptions of Holland's theory. Compared to the studies of employed adults, however, scholars who have used Holland's theory to study the educational abilities and interests of college students have generally given more attention to the socialization assumption, which in this case is to assume that different academic environments (for example, different clusters of academic majors) are likely to reinforce and reward different patterns of student abilities and interests.

In our own work over the past decade we have examined the validity of all three basic assumptions of Holland's theory. The collective evidence from our longitudinal studies of 2,309 students in over 300 college and universities generally supports the validity of all three of these assumptions. Of particular interest in our findings is that the sociological component of Holland's theory (i.e., the socialization assumption) is at least as important, if not more important, in explaining the change and stability of students' educational abilities and interests than the more psychological components of the theory (the self-selection and congruence assumptions). Our collective findings clearly support the proposition that the likelihood of students increasing their *initially prominent characteristics* over a four-year period is largely a function of whether or not they choose an academic environment that is congruent with their dominant personality type at the time they enter college (Smart et al., 2000; Feldman et al., 1999). At the same time, equal, if not more compelling, evidence

supports the socialization assumption of Holland's theory in that college students, irrespective of their dominant personality types as freshmen, are equally influenced by the prevailing norms and values of whatever academic environment they select (Smart et al., 2000; Feldman et al., 2001, 2004). We found that academic environments were in a sense equally successful in socializing students to their distinctive set of preferred abilities and interests for students with both congruent and incongruent dominant personality types (Feldman et al., 2001, 2004).

A Growing Focus on the Centrality of the Sociological Assumption of Holland's Theory

Even though Holland has maintained that his theory of careers (including its basic assumptions) is equally applicable in educational settings, we nevertheless wonder whether the ways in which the theory has been used to explain vocational behavior might differ from the ways in which the theory is used by scholars who embrace different research paradigms. As noted, most research to date on the validity of the basic assumptions of Holland's theory has focused on the explanation of vocational behavior and been conducted primarily by psychologists. The fundamental interest in this line of inquiry has been to "suggest some practical ideas to help young, middle-aged, and older people select jobs, and attain vocational satisfaction" (Holland, 1997, p. 12), and in accord with this guiding interest primary attention has been given to the self-selection and congruence assumptions of the theory.

A concern we have about the appropriateness of the congruence assumption, particularly when it is applied to educational settings, stems from its view that the extent to which person-environment fit contributes to "successful" vocational behavior is to be judged solely by the degree to which individuals enhance their initially prominent characteristics—that is to say, for example, the extent to which person-environment fit enhances the Investigative abilities and interests of individuals with a dominant Investigative personality type. This criterion is silent about the extent to which individuals of certain personality types (for example, those with an initially dominant Investigative personality type) grow and change in terms of *other* abilities and interests (for example, Artistic, Social, and Enterprising abilities and interests).

The emphasis on the congruence assumption and the criteria used to judge "success" in explaining vocational behaviors and interests, while perhaps sensible or appropriate in vocational contexts, becomes problematic when the focus is on educational behaviors and interests of college students. We say this because colleges and universities have historically sought to promote student growth and development in a broad repertoire of competencies and interests, regardless of the initially prominent characteristics of their entering students. This historically grounded emphasis is manifested in the general education distribution requirements of virtually all colleges and universities and is especially apparent in liberal arts colleges with their distinctive emphasis on the premises of liberal or general education (Astin, 1970a, b; Bowen, 1977; Lenning et al., 1977; Ewell, 1984; Association of American Colleges, 1985).

It seems to us that an implication in the writing of scholars who examine the consequences of the congruence assumption within the parameters of Holland's theory is that personality traits (including interests and abilities) are immutable and thus individuals who fail to select work or academic environments congruent with their dominant personality type are doomed to some degree of failure or unhappiness in their vocational or academic careers. But our own findings (Smart et al., 2000; Feldman et al., 2001, 2004) suggest that this is not necessarily the case. For example, although students who do not choose an academic environment congruent with their dominant personality type may well hamper (if not sacrifice) their potential to develop further their *initially prominent characteristics*, the powerful socialization effects of whatever academic environment they enter make it likely that any lack of increase in initially prominent characteristics—that is, either stability or decline in these characteristics—will be compensated for, or offset by, the enhancement of other abilities and interests. We are doubtful that such a change in the overall patterns of losses, stability and growth across multiple domains of abilities and interests would be considered negative or a “loss” by college officials who seek to facilitate the growth and development of a more comprehensive repertoire of abilities and interests in students.

Alternative Patterns of Student Success Within the Context of Holland's Theory

Our series of collaborative inquiries has led us to believe that Holland's theory can be used to identify different patterns of student success in postsecondary education. These patterns are derived from the relative emphasis that scholars using Holland's theory place on the congruence assumption versus the socialization assumption of the theory. The following discussion provides an in-depth understanding of two alternative patterns of student success in postsecondary education based on reliance on the congruence and the socialization assumptions of the theory, respectively.

Student Success Derived from the Congruence Assumption of Holland's Theory

As noted, scholars who base their inquiries on, and seek to, assess the validity of the congruence assumption in Holland's theory define student success solely in terms of the degree to which students enhance their initially prominent characteristics—that is to say, the distinctive repertoire of competencies and interests associated with their respective dominant personality types—as a consequence of their college experiences. In principle, this emphasis on the individual in his or her academic environment reflects a psychological orientation—or perhaps more precisely a social psychological orientation—underlying the congruence assumption, one which “blends” considerations of the personality type of students with the reinforcement efforts of faculty in the respective academic environments. According to the congru-

ence assumption, the likelihood of a student developing any specific repertoire of competencies and values is *jointly dependent* on the student's own personality type and the congruence or "fit" between it and the student's entry into an academic environment that requires, reinforces, and rewards that particular repertoire. Thus, both the student's personality type *and* the substantive nature of academic environments are essential components in assisting individual students in the selection of educational settings in which they presumably have the greatest potential to further develop their initially prominent characteristics. The underlying logic of the person-environment "fit" (congruence) assumption is that students are most likely to be successful in terms of further developing their initially prominent characteristics in an academic environment having the same label because such an environment would provide opportunities, activities, tasks, and roles congruent with the competencies, interests, and self-perceptions of its parallel personality type. By the same token, students who enroll in incongruent academic environments would not be as successful in terms of developing their initially prominent characteristics because the environment would provide opportunities, activities, tasks, and roles that are not congruent with the competencies, interests, and self-perceptions of the students' dominant personality types. Consideration of both the individual and the environment is presumably essential to understanding the potential consequences of individual behavior in academic settings. We might call this the psychological (or, perhaps, the social psychological) component of Holland's theory.

Student Success Derived from the Socialization Assumption of Holland's Theory

In contrast to the congruence assumption, the socialization assumption of Holland's theory postulates that the key element in promoting student acquisition of one rather than another set of interests, competencies and talents is the academic environments (i.e., departments) that students enter. Here, the roles of faculty members and their collective efforts to socialize students to the prevailing norms and values of their respective academic environments is the primary component, and the personality types and associated initial abilities and interests of students—that is, their initially prominent characteristics—are of less importance and perhaps even irrelevant. That is to say, for example, that the likelihood of students developing any specific repertoire of competencies, interests, and values is *singularly dependent* upon their entry into an academic environment that requires, reinforces, and rewards that particular repertoire. Within the parameters of the socialization assumption, "student success" is judged by the extent to which students grow in terms of the abilities and interests reinforced and rewarded by their chosen environment (say, their academic major) rather than enhancing their initially prominent characteristics. For example, while students who select academic majors that are incongruent with their personality type may remain the same or even decline in their initially prominent characteristics, they may gain or grow in the abilities and interests reinforced and rewarded by their chosen academic environment (i.e., major field of study). In this respect, the socialization assumption has a decided sociological orientation because of its focus on the

collective group effects of academic environments. The effects of academic environments in Holland's theory are not assumed to be inherently dependent on the attributes of individual students who enter them. The respective academic environments are assumed to have similar or uniform effects on *all* students in them—irrespective of the students' personality types.

Juxtaposing the Alternative Perspectives on Student Success Within Holland's Theory

Some might regard these two perspectives of student success in postsecondary education as being inconsistent or contradictory. We do not see them as being in conflict, but rather being directed toward two distinct but related questions.

From the *individual* perspective, the congruence assumption hypothesizes a differential pattern of longitudinal change and stability in initially prominent characteristics for comparable students (i.e., those with similar personality profiles) entering similar and dissimilar academic environments: those entering congruent academic environments will grow or gain more in terms of their initially prominent characteristics than those entering incongruent environments. If the question is the extent to which academic environments are tools to perpetuate the initially prominent characteristics of students at the time they enter college, then the answer is, "yes they are." Those initially prominent characteristics will be enhanced if, and only if, students enter academic environments that reinforce and reward those specific abilities and interests (see Feldman et al., 1999; Smart et al., 2000, pp. 172–209). But the congruence assumption is silent as to the collective effects of the respective academic environments on students in them with different personality profiles because the fundamental concern of the congruence assumption is the pattern of change and stability in the initially prominent characteristics of individual students within the different academic environments.

From the *group* perspective, the socialization assumption implicitly postulates a uniform pattern of reinforcement and reward by faculty members in the respective academic environments, or, at the very least, does not consider potentially different patterns of longitudinal change and stability in student abilities and interests depending on students' congruence or incongruence with the environment because the focal concern of the socialization assumption is on the collective actions and effects of academic environments. This is a decidedly different question concerning the extent to which academic environments are successful in their efforts to socialize a disparate collection of students to the distinctive pattern of preferred abilities and interests of the environments. Research grounded in the socialization assumption seeks to determine whether academic environments are as "effective" with students who begin with lower levels of commensurate abilities and interests (i.e., students whose personality types are incongruent with the environment) as those with higher levels of commensurate abilities and interests that are reinforced and rewarded by the environment (i.e., students whose personality types are congruent with the environment). The evidence we have provided

in earlier studies (Smart et al., 2000, pp. 210–233; Feldman et al., 2001, 2004) provides the basis for an affirmative response: that is, yes, the impacts of academic environments appear to be comparable for students whose personality types are congruent or incongruent with the respective environments. Thus, we do not find the two sets of findings to be in conflict, but rather directed toward two distinct but related questions.

These two distinct but related components of Holland's theory suggest or imply quite different patterns of "student success" in postsecondary education. For example, from the *individual* perspective, grounded in the self-selection and congruence assumptions of Holland's theory, the "success" of colleges and universities in fostering the growth and development of college students is judged solely by their effectiveness in further developing students' initially prominent characteristics. Students would be encouraged to select academic environments (i.e., majors) that are congruent with their dominant personality type at the time they enter college, and the reinforcement and reward patterns of those environments would assist students in the further development of their initially defining repertoire of abilities and interests at the time they entered college. The consequence of this logic yields a profile of "student success" that is highly peaked or skewed in one particular set of abilities and interests with little or no consideration given to students' acquisition of other sets of abilities and interests. On the other hand, from the *group* perspective, grounded in the socialization assumption of Holland's theory, the "success" of college and universities in contributing to the growth and development of college students is judged solely by the extent to which students acquire the distinctive cluster of abilities, interests, and values that are required, reinforced, and rewarded by whatever academic environment (i.e., major) they select. Students would not necessarily be advised to select academic environments that are congruent with their personality types at the time they enter college, but rather to have their choices of academic environments informed by the distinctive repertoire of abilities, interests, and values that the respective environments expect and subsequently reinforce and reward. Students would then select academic majors (i.e., environments) that are most likely to assist them in subsequently developing whatever cluster of abilities, interest, and values they wish to acquire. The consequence of this logic yields a profile of "student success" that is more balanced across two or more clusters of abilities, interests, and values. The assumption underlying this perspective is that while students who select academic environments that are incongruent with their dominant personality type may remain the same or even decline in their initially prominent characteristics, they will gain or grow in the distinctive cluster of abilities and interests reinforced and rewarded by their chosen academic environment.

Illustration of Alternative Patterns of Student Success

In this section we provide illustrative examples of the alternative patterns of student success in postsecondary education based on the congruence and socialization assumptions of Holland's theory described above. The sample of students and the

variables for our present analyses are essentially the same as those of our previous analyses (Smart et al., 2000; Feldman et al. 1999, 2001, 2004). However, although some of the data in this section have been presented in our earlier work, we now include additional data not presented before (in Table 4). Moreover, the visual displays (Figs. 2–9) are new.

Research Procedures

Sample

Our data came from the 1986 and 1990 surveys of the Cooperative Institutional Research Program (CIRP) sponsored by the Higher Education Research Institute at the University of California, Los Angeles. The overall CIRP sample consisted of 4,408 students attending 360 different postsecondary institutions. Students completed the standard CIRP freshman survey upon entering college in the fall of 1986 and a follow-up survey in the winter of 1990. The latter survey obtained information about the experiences of these students at college and how these students felt they had changed during the four years. Our analyses are based on the responses of 2,309 students who were enrolled for all four years, whose academic major is included in Holland's (1997) classification of academic majors, and who provided complete information on the variables under investigation.

Variables

Our present analyses are based on three major sets of variables: students' academic environments (i.e., clusters of academic majors), measures of students' abilities and interests in 1986 and 1990, and students' dominant personality types. The following provides a description of each of these three major sets of variables.

Academic Environments. The 1986 freshman survey asked students to select their "probable field of study" and the 1990 follow-up survey asked students to select their "current/last field of study" from a listing of academic disciplines/majors. We classified these academic majors into the six academic environments proposed by Holland by using *The College Majors Finder* (Rosen et al., 1989). A total of 64 of the 76 majors selected by the students could be thus classified. The Realistic and Conventional categories, however, had a combined total of only four academic majors with too few students to be useful in our analyses; consequently these two categories are not included in our research. The number of students in each of the remaining four groups of academic majors is: Investigative (n = 672); Artistic (n = 334); Social (n = 788); and Enterprising (n = 515). A listing of which academic majors are classified into which of the four groups can be found in Smart et al. (2000) (also see Feldman et al., 1999, 2001).

Ability and Interest Scales. The 1986 and 1990 CIRP surveys asked students to rate themselves compared with the average person their age on twelve different abilities (e.g., mathematical ability, social self-confidence, etc.) on a scale with 1 = lowest 10%, 2 = below average, 3 = average, 4 = above average, and 5 = highest 10%. Students were also asked to indicate the importance of eighteen general goals and values (e.g., creating artistic work, being very well off financially, etc.) using a scale of 1 = not important, 2 = somewhat important, 3 = very important, and 4 = essential. From these items, we picked out those that were characteristic of adjectives used to describe the four Holland personality types considered in our analyses (Holland, 1997). We used 26 items to create precollege (1986) and follow-up (1990) scales reflecting the distinctive abilities, interests, and goals that each of the four groups of academic majors, classified according to Holland's theory, are hypothesized to require, reinforce, and reward. These scales, then, represent students' self-reported abilities and interests at the time they began college (1986 scores on the Investigative, Artistic, Social, and Enterprising scales) and four years later (1990 scores on these scales). The 1986 and 1990 scales are shown in Table 3.

Each of these scales (in both years) was created by standardizing the items and computing the average across items. Student scores were converted to T-scores with a mean of 50 and a standard deviation of 10. The number of items in each of these scales and the alpha reliability of each scale are as follows: Investigative Ability and Interest Scale, five items ($\alpha = 0.682$ [1986] and 0.630 [1990]); Artistic Ability and Interest Scale, six items ($\alpha = 0.683$ [1986] and 0.697 [1990]); Social Ability and Interest Scale, six items ($\alpha = 0.750$ [1986] and 0.794 [1990]); Enterprising Ability and Interest Scale, nine items ($\alpha = 0.752$ [1986] and 0.762 [1990]). The exact wording of these items can be found in Smart et al. (2000) as well as in Feldman et al. (1999, 2001).

Students' Personality Types. Holland (1997, pp. 28–31) has noted that an individual's personality type may be measured by his or her responses to ability and interest scales. We used the four 1986 ability and interest scales just described to determine each student's *primary personality type*. The profile for each of the 2,309 students was obtained and, in accordance with a suggestion by Holland (1997, p. 28), students were assigned to the personality type for which they had the highest scale score (in 1986). This procedure, which is consistent with scoring of student responses to established occupational and personality inventories such as the Self-Directed Search, Vocational Preference Inventory, and the Strong-Campbell Interest Inventory, resulted in the following distribution of students across the personality types: Investigative ($n = 789$); Artistic ($n = 377$); Social ($n = 553$); and Enterprising ($n = 590$).

Analyses

Data presented in this report are based on means on the 1986 and 1990 ability and interest scales for each of the four student personality types. We adapted a procedure developed by Roberts (1980) to adjust initial scores for regression-to-the-mean bias (as described in greater detail in Smart et al., 2000; Feldman et al., 2001). Dependent samples *t*-tests were used to determine the statistical significance of

Table 3 1986 and 1990 student ability and interest scales^a

<i>1986 and 1990 Investigative Scales</i>	<i>Reliability</i>
Self-rating: Self-confidence (intellectual)	$\alpha = 0.682$ (1986)
Self-rating: Academic ability	$\alpha = 0.630$ (1990)
Self-rating: Mathematical ability	
Self-rating: Drive to achieve	
Goal: Making a theoretical contribution to science	
<i>1986 and 1990 Artistic Scales</i>	<i>Reliability</i>
Self-rating: Artistic ability	$\alpha = 0.683$ (1986)
Self-rating: Writing ability	$\alpha = 0.697$ (1990)
Goal: Becoming accomplished in one of the performing arts (acting, dancing, etc.)	
Goal: Writing original works (poems, novels, short stories, etc.)	
Goal: Creating artistic work (painting, sculpture, decorating, etc.)	
Goal: Developing a meaningful philosophy of life	
<i>1986 and 1990 Social Scales</i>	<i>Reliability</i>
Goal: Influencing the political structure	$\alpha = 0.750$ (1986)
Goal: Influencing social values	$\alpha = 0.794$ (1990)
Goal: Helping others who are in difficulty	
Goal: Becoming involved in programs to clean up the environment	
Goal: Participating in a community action program	
Goal: Helping to promote racial understanding	
<i>1986 and 1990 Enterprising Scales</i>	<i>Reliability</i>
Self-rating: Leadership ability	$\alpha = 0.752$ (1986)
Self-rating: Popularity	$\alpha = 0.762$ (1990)
Self-rating: Self-confidence (social)	
Goal: Become an authority in my field	
Goal: Obtaining recognition from my colleagues for contributions to my special field	
Goal: Having administrative responsibility for the work of others	
Goal: Being very well off financially	
Goal: Being successful in a business of my own	
Goal: Becoming an expert on finance and commerce	

^aFor the Self-rating items, students responded to the prompt “Rate yourself on each of the following traits as compared with the average person your age” using a scale of 1 = Lowest 10%; 2 = Below average; 3 = Average; 4 = Above average; 5 = Highest 10%. For the Goal items, students responded to the prompt “Indicate the importance to you personally of each of the following” using a scale of 1 = Not important; 2 = Somewhat important; 3 = Very important; 4 = Essential

students’ change from 1986 to 1990 on each of the ability and interest scales. In Table 4—which gives the means, changes in means, and effect sizes for those changes—statistically significant changes ($p < 0.05$) are indicated by asterisks. In part, we focus our discussion of these results around the magnitude of the effect sizes, which represent the change from 1986 to 1990 in standard deviation units. The data given in Table 4 are the basis for Figs. 2 through 9. Note that the numbers in Table 4 are rounded to two decimal places while the numbers in the figures are rounded to one decimal place.

Table 4 Average change in abilities and interests for students with different dominant personality types majoring in academic disciplines expressed as standardized scores and in standard deviation units (effect sizes)^a

Investigative personality majoring in:	Change in investigative abilities and interests	Change in artistic abilities and interests	Change in social abilities and interests	Change in enterprising abilities and interests
Investigative fields	+1.67 (56.94 to 58.62) 0.32*	-1.12 (48.11 to 46.99) (-0.27*)	-1.05 (48.32 to 47.27) (-0.20*)	-1.08 (49.03 to 47.95) (-0.20*)
Artistic fields	-4.12 (55.48 to 51.36) (-0.84*)	+2.35 (51.69 to 54.04) 0.48*	-0.19 (47.44 to 47.25) (-0.04)	-1.47 (47.52 to 46.05) (-0.30)
Social fields	-1.07 (54.01 to 52.94) (-0.17)	-0.75 (47.76 to 47.01) (-0.12)	+0.67 (48.27 to 48.94) 0.11	-1.28 (47.76 to 46.48) (-0.21*)
Enterprising fields	+0.48 (54.87 to 55.35) 0.09	-0.29 (47.31 to 47.02) (-0.05)	-2.55 (46.99 to 44.44) (-0.45*)	+3.17 (48.55 to 51.72) 0.56*
Artistic personality majoring in:	Change in artistic abilities and interests	Change in investigative abilities and interests	Change in social abilities and interests	Change in enterprising abilities and interests
Artistic fields	+4.18 (58.59 to 62.77) 0.72*	-1.70 (48.58 to 46.88) (-0.29*)	+0.99 (49.05 to 50.04) 0.17	-1.32 (47.17 to 45.85) (-0.23*)
Investigative fields	-2.10 (57.01 to 54.91) (-0.39*)	+2.82 (50.34 to 53.16) 0.52*	+1.27 (49.47 to 50.74) 0.23	+0.51 (47.21 to 47.72) 0.09
Social fields	-2.19 (56.11 to 53.92) (-0.35*)	+0.18 (47.31 to 47.49) 0.03	+2.88 (49.33 to 52.21) 0.46*	-0.77 (47.43 to 46.66) (-0.12)
Enterprising fields	+0.94 (55.72 to 56.65) 0.16	-0.21 (45.65 to 45.44) (-0.04)	-0.22 (48.66 to 48.44) (-0.04)	+0.94 (48.27 to 49.21) 0.17
Social personality majoring in:	Change in social abilities and interests	Change in investigative abilities and interests	Change in artistic abilities and interests	Change in enterprising abilities and interests
Social fields	+0.81 (53.80 to 54.61) 0.13	-1.19 (46.74 to 45.55) (-0.19*)	-0.54 (47.75 to 47.21) (-0.09)	-1.17 (48.13 to 46.96) (-0.18*)
Investigative fields	+0.25 (54.33 to 54.58) 0.05	+0.84 (49.22 to 50.06) 0.15	-1.23 (48.31 to 47.08) (-0.23*)	+0.16 (48.69 to 48.85) 0.03
Artistic fields	+1.43 (55.30 to 56.73) 0.29	-1.65 (48.36 to 46.71) (-0.34)	+4.71 (52.38 to 57.09) 0.96*	+0.10 (49.46 to 49.56) 0.02
Enterprising fields	-3.09 (53.42 to 50.33) (-0.55*)	+0.79 (46.09 to 46.88) 0.14	+0.51 (47.32 to 47.83) 0.09	+3.25 (49.18 to 52.43) 0.58*

Enterprising fields	+2.20 (55.19 to 57.39) 0.38*	-0.64 (47.70 to 47.06) (-0.11)	-1.70 (49.18 to 47.48) (-0.30*)	-0.03 (46.55 to 46.52) (-0.01)
Investigative fields	+2.67 (55.99 to 58.66) 0.49*	+2.31 (50.42 to 52.73) 0.43*	-0.07 (49.15 to 49.08) (-0.01)	-0.66 (46.09 to 45.43) (-0.12)
Social fields	-1.91 (54.29 to 52.38) (-0.31*)	-0.23 (47.82 to 47.59) (-0.04)	+0.43 (48.79 to 49.22) 0.07	-0.30 (46.61 to 46.31) (-0.05)
Artistic fields	-0.87 (56.43 to 55.56) (-0.18)	-2.07 (50.57 to 48.50) (-0.42)	+0.99 (49.45 to 50.44) 0.20	+4.57 (50.10 to 54.67) 0.93*

^aIn each cell, average change is given first, with 1986 and 1990 scores following (in parentheses) and then effect size (in bold)

*Difference is significant at $\alpha = 0.05$.

Findings

We portray certain findings from our current analyses in Figs. 2 through 5, which reflect changes in standard deviation units (i.e., effect sizes) of students' scores on each of the four ability and interest scales shown in Table 3 for students of each of the four personality types whose academic majors were in each of the four academic environments of Holland's theory. Table 4 presents a complete set of means and effect sizes that is the basis for these figures and additional analyses. Figure 2, for example, shows changes in the effect size and direction in the four ability and interest scales for students with an Investigative personality type whose academic majors were classified according to each of the four academic environments. Figures 3 through 5 provide similar information for students with Artistic, Social, and Enterprising personality types, respectively.

Two alternative patterns of student success in higher education (within the context of Holland's theory) can be seen from the patterns of change and stability shown in Table 4 and Figs. 2 through 5.

The Congruence Assumption and College Student Success

The profiles for the patterns of change and stability between 1986 and 1990 in the four sets of abilities and interests for each of the four personality types who entered each of the four academic environments provide support for the definition of

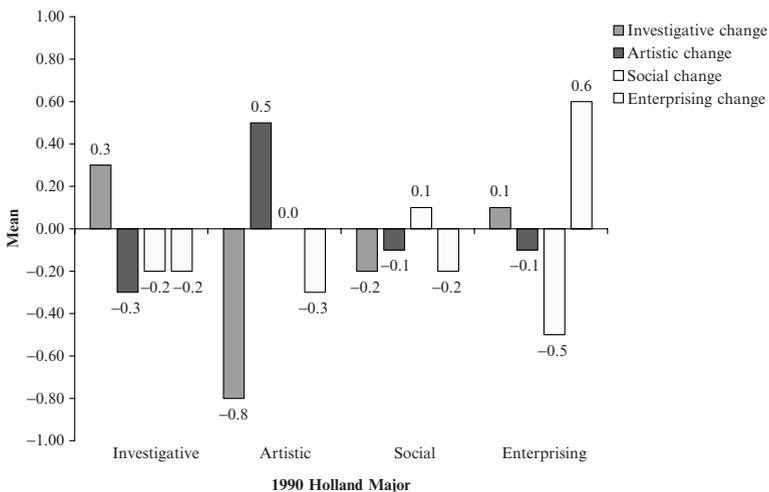


Fig. 2 Investigative personalities: change in traits from 1986–1990 in standard deviations (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

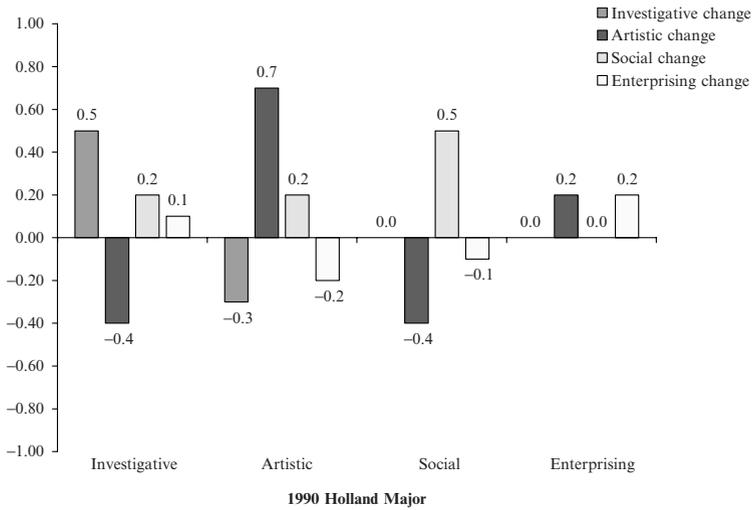


Fig. 3 Artistic personalities: change in traits from 1986–1990 in standard deviations (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

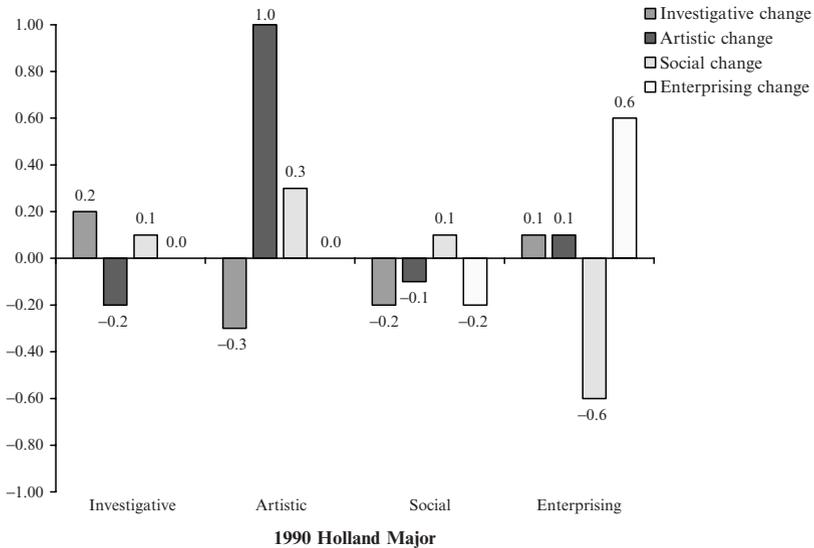


Fig. 4 Social personalities: change in traits from 1986–1990 in standard deviations (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

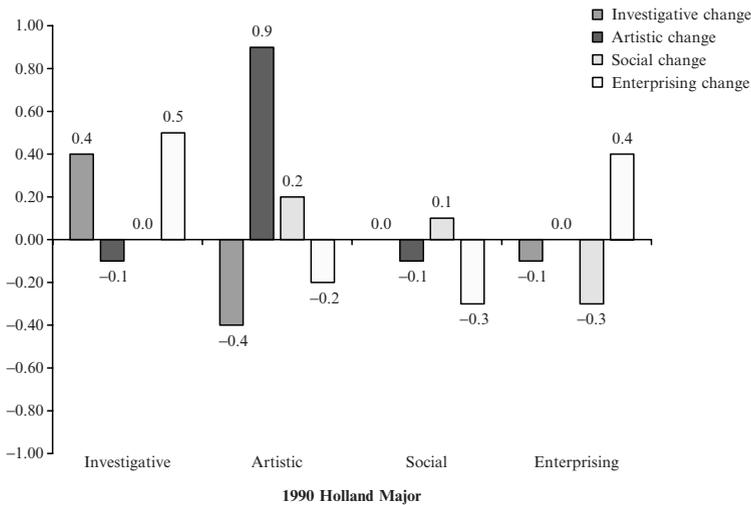


Fig. 5 Enterprising personalities: change in traits from 1986–1990 in standard deviations (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

college student success within the context of the congruence assumption of Holland's theory in that subsequent growth in their initially prominent characteristics is basically contingent on their selection of a congruent, as opposed to incongruent, academic environment. This common pattern is evident in the four profiles for students with an Investigative personality type in Fig. 2 who essentially grew in Investigative abilities and interests only if they entered Investigative academic environments and remained essentially stable or declined in Investigative abilities and interests if they entered any of the three other academic environments. To be more specific, those Investigative personality types who entered congruent (i.e., Investigative) environments grew in Investigative abilities and interests (effect size = 0.32, see Table 4) and remained stable or declined in these abilities and interests if they selected an incongruent academic environment (effect sizes for those entering Artistic, Social, and Enterprising environments are $[-]0.84$, $[-]0.17$, and 0.09 , respectively). This same general pattern is evident for students with Artistic, Social, and Enterprising personality types (see Table 4 and Figs. 3 through 5), though there are a couple of exceptions. One exception is that while Enterprising types who entered Enterprising academic environments did gain in enterprising abilities and interests (effect size = 0.38), so did Enterprising types who entered Investigative academic environments (effect size = 0.49). A second exception is that although Social types who entered Social academic environments did show increases in Social abilities and interests, this increase was not statistically significant. However, consistent with the congruence assumption, Social types who entered the other three academic environments remained stable or decreased in Social abilities and

interests. Overall, the data in Table 4 (and in Figs. 2 through 5) are consistent with and support the definition of college student success within the context of the congruence assumption of Holland's theory; that is, students' likelihood of growth in their initially prominent characteristics is *jointly dependent* on the student's own personality type and the congruence or "fit" between it and the student's entry into an academic environment that requires, reinforces, and rewards that particular repertoire of abilities and interests.

The Socialization Assumption and College Student Success

Figures 2 through 5 (as well as Table 4) collectively provide clear evidence in support of the socialization assumption of Holland's theory in that there is a consistent pattern of student growth in the distinctive ability and interest scale that is assumed to be required, reinforced, and rewarded by each of the four academic environments, irrespective of the students' primary personality types. Take, for example, the profiles in Fig. 2 for students with an Investigative personality type. These profiles show that any appreciable growth in the four sets of abilities and interests is for the most part or for most students, dependent on the academic environment of their major field of study, and that they tend to either remain stable or decline, in some instances very dramatically so, in the three other sets of abilities and interests that are not reinforced or rewarded by the academic environment of their major field of study. For example, substantial growth of investigative types in Investigative abilities and interests is dependent on their entry into Investigative environments (effect size = 0.32, see Table 4), growth in Artistic abilities and interests is evident only for those Investigative types in Artistic environments (effect size = 0.48), and growth in Enterprising abilities and interests is characteristic of only those Investigative types who enter Enterprising environments (effect size = 0.56). (Note that Investigative types who entered Social academic environments also show increases in Social abilities and interests, but these increases are not statistically significant.) The pattern of findings for Investigative types is generally true for students with Artistic, Social, and Enterprising personality types (Figs. 3, 4 and 5, respectively), thus offering further support for the socialization assumption.

Further Observations Regarding Alternative Patterns of Student Success

Additional Analysis of the Importance of Academic Environment to Student Success

Our findings presented above, in conjunction with those from our earlier collaborative work (Feldman et al., 1999, 2001, 2004; Smart & Feldman, 1998; Smart et al.,

2000), point to the absolute centrality of academic environments, as defined in Holland's theory, as a primary influence on longitudinal change and stability in patterns of college student success across a broad repertoire of abilities, interests, and values. In general, our collective findings support the conclusion reached by Pace (1990b) that academic environments (disciplines) are a primary influence on "the extent and direction of student progress in college" (p. 76). In essence, we have found that students learn what they study, which is to say the distinctive repertoire of professional and personal self-perceptions, competencies, attitudes, interests, and values that their respective academic environments distinctly reinforce and reward.

While there is abundant evidence supporting the congruence assumption of Holland's theory (see, for example, the meta analytic findings of Assouline & Meir, 1987; Spokane, 1985; Spokane et al., 2000; Tsabari et al., 2005), our findings suggest a stronger socialization than psychological dynamic at work in Holland's theory given the consistent and pervasive effects of academic environments on both congruent and incongruent students (see especially Feldman et al., 2004). While we have, in general, found consistent support for the congruence assumption of Holland's theory, the psychological component of the theory (see especially Feldman et al., 1999), we now regard those findings as simply reflecting the success of academic environments, the sociological component of the theory, in their efforts to assist congruent students acquire the distinctive pattern of abilities and interests they respectively seek to reinforce and reward. But we have also found these same academic environments to be equally successful in their efforts in assisting incongruent students to acquire the distinctive pattern of abilities and interests they respectively seek to reinforce and reward (see especially Feldman et al., 2001, 2004).

This leads us to the fundamental conclusion that it is really the sociological component of Holland's theory, the academic environment, that is the primary vehicle that drives the entire theory. Academic environments are not only central to the established validity of the socialization assumption of the theory, but are also of fundamental importance to the established validity of the self-selection and congruence assumptions of the theory. For example, students could not make informed choices among the many potential academic majors (i.e., environments) if those environments did not establish their relatively unique public identity by their distinctive reinforcement and reward patterns and their efforts to recruit students who possess the distinctive patterns of abilities and interests they respectively hope to reinforce and reward. In addition, as noted above, the validity of the congruence assumption would not be possible without the successful reinforcement and reward efforts of academic environments in their interactions with congruent students.

Our collective findings concerning both the congruence and socialization assumptions of Holland's theory suggest two broad general patterns of student success in postsecondary education. The first pattern is based on the congruence assumption in which student success is defined in terms of the likelihood of students' enhancing their initially prominent characteristics. The congruence assumption stipulates that this likelihood is contingent on students entering academic environments that are congruent with their personality types. Our findings in Figs. 2 through 5 of the present study, and our earlier findings (Feldman et al., 1999; Smart

et al., 2000), suggest that the profile of student success that emerges from the congruence assumption is a more peaked or highly differentiated profile reflecting further growth in students' initially prominent characteristics and either stability or decline in their three other sets of abilities and interests. This general pattern, for example, is evident in the findings for Investigative type students shown in the far left columns of Fig. 2 in which those that enter congruent (i.e., Investigative) environments grow in Investigative abilities and interests (effects size = 0.32, see Table 4) and remain stable or decline in these abilities and interests if they select an incongruent academic environment (effect sizes for those entering Artistic, Social, and Enterprising environments are $[-]0.84$, $[-]0.17$, and 0.09 , respectively). These Investigative type students entered college in 1986 with a higher Investigative ability and interest mean score than their Artistic, Social, and Enterprising type peers, and, four years later there is a clear pattern of further accentuation of these freshman year differences in terms of their initially prominent characteristics. This general pattern is also evident for the three other personality types with the two exceptions noted earlier. Thus, student success within the context of the congruence assumption leads to further accentuation of freshman year differences on students' initially prominent characteristics, and results in a more peaked or highly differentiated profile as a result of students' college experiences. Put otherwise, students become better at what they were best at the time they enter college, and remain stable or decline in their other abilities and interests.

The first pattern of success can also be seen in Figs. 6 through 9, which present the actual 1986 and 1990 means (see Table 4) on the four ability and interest scales for students of each of the four personality types whose academic majors were in congruent and incongruent academic environments. The top set of rows (for students with an Investigative personality type) in Fig. 6, for example, shows this more peaked or highly differentiated pattern for students with a dominant Investigative personality type whose academic majors were in a congruent (i.e., Investigative) academic environment. These students' scores on the Investigative ability and interest scale increased from 56.94 (or 56.9 when rounding) in 1986 to 58.62 (58.6) in 1990 (effect size = 0.32, see Table 4), while their scores on the three other ability and interest scales declined (effect sizes for the Artistic, Social, and Enterprising scales = $[-]0.27$, $[-]0.20$, and $[-]0.20$, respectively). This basic pattern is true for students with Artistic, Social, and Enterprising personality types—see Figs. 7, 8, and 9, respectively. Even what may be seen to be the one single exception—Artistic students in Artistic academic environments increasing in Social abilities and interest from 49.05 (49.1) in 1986 to 50.04 (50.0) in 1990—is really not since the effect size of 0.17 is not statistically significant.

The second pattern of student success is grounded in the socialization assumption in which student success is defined in terms of the distinctive patterns of abilities and interests that are reinforced and rewarded by whatever academic environment they choose. That pattern of student success is also evident in the findings for Investigative type students shown in Fig. 2, in which their growth in any of the four sets of abilities and interests is *singularly dependent* on their chosen academic environment; that is, for example, only those who enter Investigative environments grow in terms of

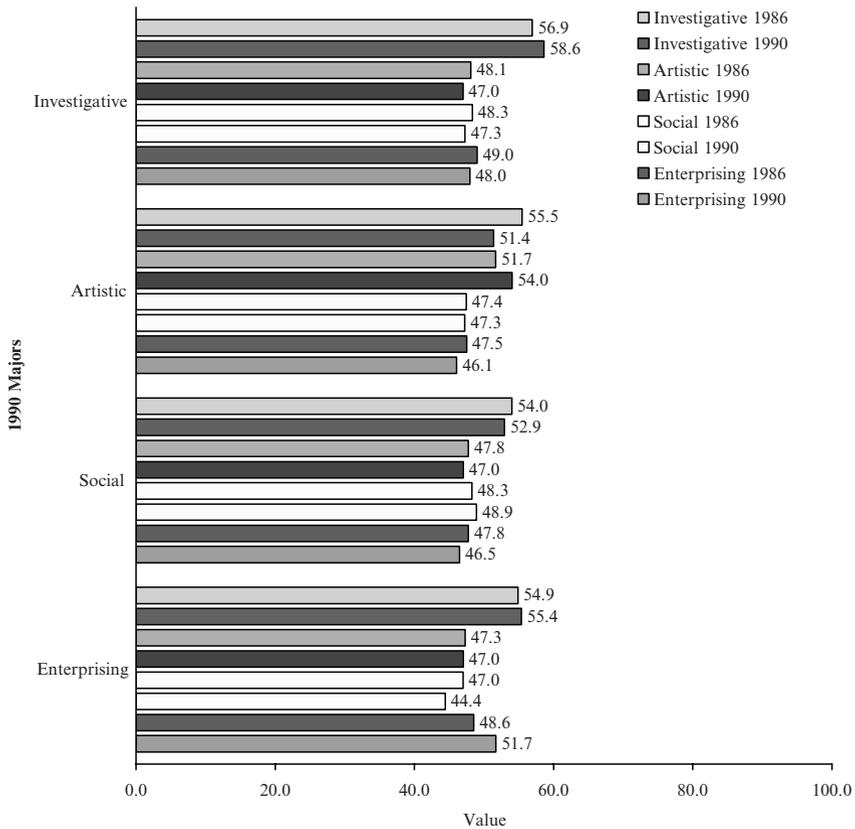


Fig. 6 Investigative personalities: 1986 and 1990 traits and abilities, by 1990 major (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

Investigative abilities and interests (effect size = 0.32, see Table 4), only those who enter Artistic environments grow in terms of Artistic abilities and interests (effect size = 0.48), only those who enter Social environments grow in terms of Social abilities and interests (effect size = 0.11, although not statistically significant in this case), and only those who enter Enterprising environments grow in terms of Enterprising abilities and interests (effect size = 0.56). Of equal importance for these Investigative type students is the finding that those who enter any of the three academic environments that are incongruent remain stable or decline in terms of their initial Investigative abilities and interests (effect sizes for those entering Artistic, Social, and Enterprising environments are [-]0.84, [-]0.17, and 0.09, respectively). These collective findings which are similar to those for Artistic, Social, and Enterprising type students, with the exceptions noted earlier, lead to a more balanced or less differentiated overall profile of abilities and interests. That is to say, the magnitude of their “losses” in terms of their initially prominent characteristics tends to be offset

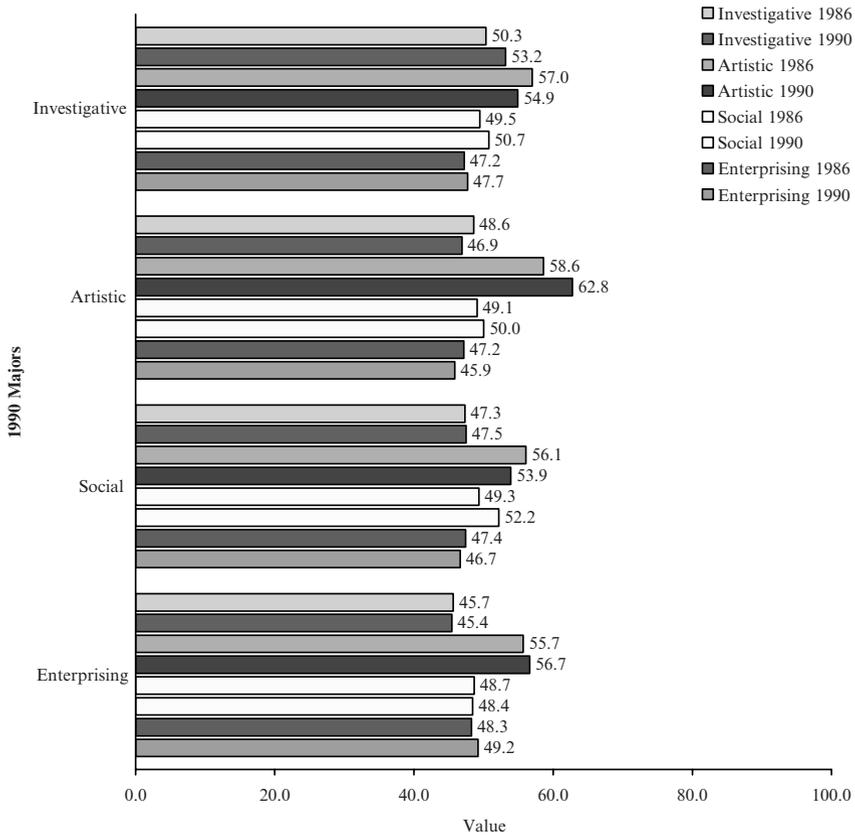


Fig. 7 Artistic personalities: 1986 and 1990 traits and abilities, by 1990 major (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

by or compensated for by the magnitude of their “gains” in the abilities and interests promoted by their chosen (but incongruent) academic environment. The consequence of this pattern, again, is a more balanced or less differentiated profile at time of graduation than at the time of college entry.

This second general pattern of student success is also clearly evident in Figs. 6 through 9. An example of this overall pattern of “loss” in an initially prominent characteristic for students majoring in incongruent academic environments being offset by or compensated for by the magnitude of their gains in the abilities and interests reinforced and rewarded by their chosen (but incongruent) academic environments is evident for students with an Investigative personality type. The second set of rows from the top in Fig. 6 shows the means for Investigative students who major in Artistic academic environments on the four sets of 1986 and 1990 ability and interest scales. While these Investigative students decline substantially from

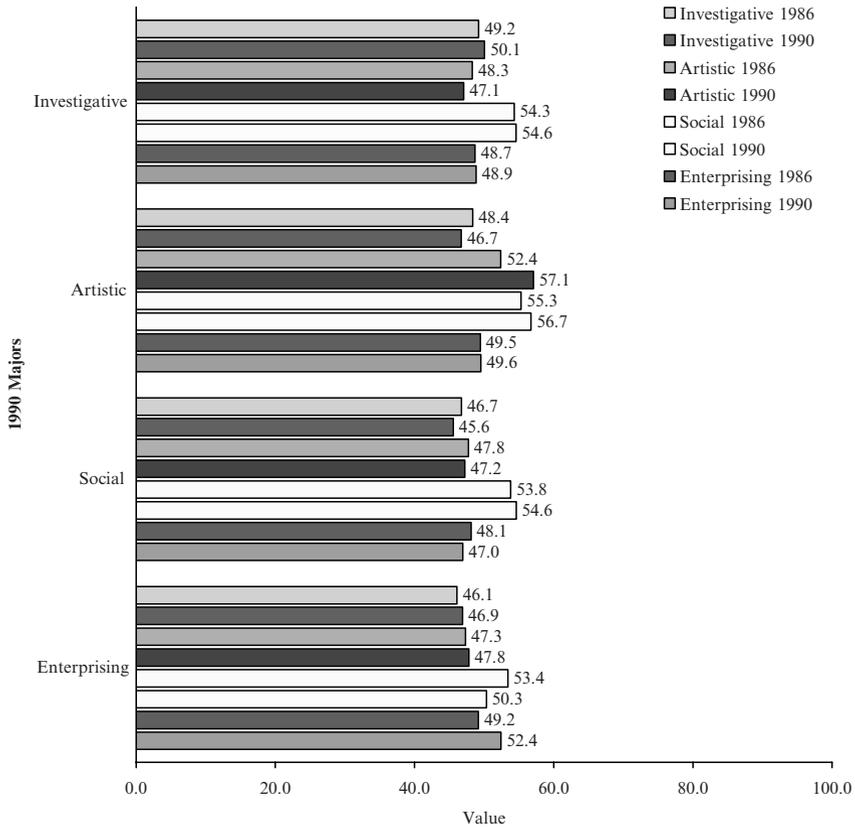


Fig. 8 Social personalities: 1986 and 1990 traits and abilities, by 1990 major (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

1986 to 1990 in terms of their Investigative abilities and interests (means of 55.48 [or 55.5 when rounding] and 51.36 [51.4], respectively, effect size = [-]0.84) and remain essentially stable or decline in their Social and Enterprising abilities and interests (mean change from 47.44 [47.4] to 47.25 [47.3], effect size = [-]0.04 and mean change from 47.52 [47.5] to 46.05 [46.1], effect size = [-]0.30, respectively), they increase substantially from 1986 to 1990 in terms of their Artistic abilities and interests that were reinforced and rewarded by their chosen (but incongruent) Artistic environment (means of 51.69 [51.7] and 54.04 [54.0], respectively, effect size = 0.48). This basic pattern is essentially the same for Investigative students who selected Social academic environments (see the third set of rows from the top in Fig. 6) and Enterprising academic environments (see the bottom set of rows in Fig. 6—as well as for students in Artistic academic environments (see Fig. 7), Social academic

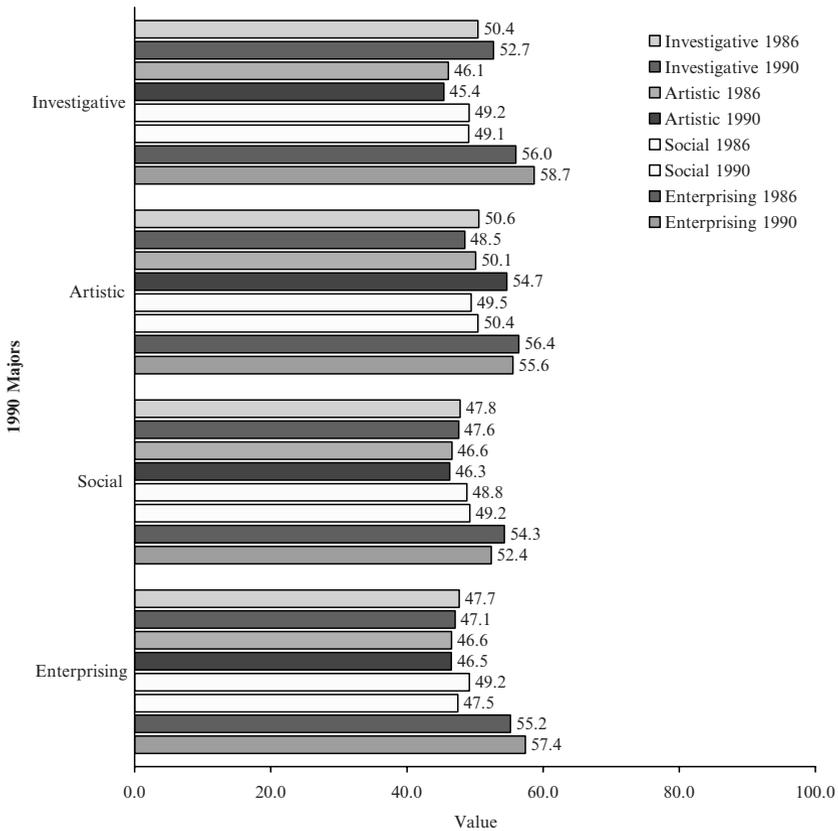


Fig. 9 Enterprising personalities: 1986 and 1990 traits and abilities, by 1990 major (From Higher Education Research Institute at the University of California, Los Angeles 1986 and 1990 Cooperative Institutional Research Program surveys)

environments (see Fig. 8), and Enterprising academic environments (see Fig. 9) students who are in their chosen (but incongruent) academic environments.

This pattern of consistent gains in the abilities and interests of students in their chosen (but incongruent) academic environments offsetting or compensating for the stability or modest decline in their initially prominent characteristics results in a more balanced or less differentiated profile at the time of graduation than at the time of college entry. Even so, it is important to note that students' initially prominent characteristics at time of college entry generally remain an important component in their overall profile across the four ability and interest scales at time of graduation. In fact, *students' initially prominent characteristics at time of college entry remain their ultimate prominent characteristic at time of graduation* in all instances, with only two exceptions (Social students in Artistic and Enterprising academic environments—evident in Fig. 8). Thus, the more balanced or less differ-

entiated profile based on the socialization assumption of Holland's theory has less to do with "losses" in their initially prominent characteristic than with increases in the repertoire of abilities and interests reinforced and rewarded by their chosen (but incongruent) academic environment.

We conclude from these data that academic environments are an absolutely essential component in Holland's theory *and* in efforts to understand student success in postsecondary education. Within the context of Holland's theory, the effects of academic environments on students' acquisition of the specific repertoire of abilities and interests that they respectively seek to reinforce and reward are uniform—that is, generally equivalent for students who are either congruent or incongruent with their academic environment. The contribution of academic environments to student success in postsecondary education depends on one's definition of "success." Within the more traditional perspective of the congruence assumption of Holland's theory, academic environments play an instrumental role in assisting students' subsequent growth in their initially prominent characteristics, leading to a more peaked or highly differentiated profile across multiple clusters of abilities and interests. Within the context of the less traditional perspective of the socialization assumption of Holland's theory that characterizes our most recent efforts (Feldman et al., 2001, 2004), academic environments play an instrumental role of assisting students in their development of whatever repertoire of abilities and interests their chosen (but incongruent) environments seek to reinforce and reward, leading to a more balanced or less differentiated profile across multiple clusters of abilities and interests.

Comparing Two Different Perspectives on the Meaning of Student Success

The two alternative patterns of student success that flow from Holland's theory in effect reflect an ongoing debate within the American academic community. This debate contrasts the relative merits of (1) the more traditional liberal arts perspective of student success grounded in the pursuit of knowledge "for its own sake" (which includes the educational preparation of students to acquire a broad repertoire of talents that would enable them to function successfully in positions of power and influence in a democratic American society) with (2) the more contemporary perspective of student success reflected in "market-based utilitarianism" (which emphasizes assisting students in their development of a more limited set of practical talents necessary for success in their subsequent occupational or vocational careers) (Brint, 2002; Brint et al., 2005; Grubb & Lazerson, 2005). This debate, which has been ongoing for decades if not longer, has been rekindled by contemporary research evidence showing, for example, that the proportion of students majoring in professional programs (e.g., business, engineering, education) has grown dramatically in recent decades at the expense of more traditional arts and sciences programs (e.g., chemistry, economics, philosophy) (Adelman, 1995; Hashem, 2002); that the proportion of students interested in "developing a mean-

ingful philosophy of life" declined by 45% between 1967 and 1987 while the proportion of students interested in "becoming well-off financially" grew by 40% over the same period (Astin, 1998); and that there has been a substantial decline from the 1960s to the 1990s in the self-reported gains of college students in such important liberal arts areas as an understanding and appreciating science, literature and the arts, awareness of different philosophies and cultures, and personal development (Kuh, 1999).

Our intent here is not to enter the debate about the relative merits of these two perspectives of student success in higher education, but rather to show that Holland's theory has meaning in the efforts of scholars to understand the primary factors contributing to student success and in the efforts of institutional and governmental officials to design programs and policies intended to foster student success, irrespective of one's comfort with or adherence to either perspective. On the one hand, the more psychologically oriented component in Holland's theory, manifested in the congruence assumption, leads to a more peaked profile of student success in which students' initially prominent characteristics become more pronounced and their other sets of abilities and interests tend to remain essentially stable or to decline. This profile has more in common with the vocational or occupational perspective of student success in that it is wholly reflective of the most common application of Holland's theory, which intends to assist individuals in selecting careers where they have the greatest likelihood of success. On the other hand, the more sociologically oriented component in Holland's theory, manifested in the socialization assumption, leads to a more balanced profile of student success in which students remain stable or decline slightly in their initially prominent characteristics and grow considerably, sometimes dramatically, in the set of abilities and interests reinforced and rewarded by their chosen, but oftentimes incongruent academic environment. The more balanced profile of student success that emerges from greater attention to the socialization assumption of the theory has more in common with the liberal arts perspective of student success, which emphasizes the need for students to develop a broader repertoire of competencies and interests to function successfully as citizens of a democratic society. In either case, the academic environment (discipline) is absolutely central.

Holland's Theory and Student Success: Practical, Programmatic, and Policy Implications

A variety of practical consequences flow from Holland's theory and the findings from our own collective inquiries over the past decade. We seek here to enumerate some practical, programmatic, and policy initiatives that flow from reliance on Holland's theory as institutional and governmental officials seek to foster student success within the context of either the more contemporary occupational (vocational) perspective or the more traditional liberal arts perspective of student success. In presenting the consequences and possible initiatives, we begin with two

examples related to student affairs personnel, then turn to implications for those responsible for student outcomes assessment, and end with implications for faculty and academic administrators in their efforts to understand and promote student success at the academic department level. These examples illustrate the applicability of Holland's theory to the tasks of institutional and governmental officials responsible for diverse aspects of undergraduate education.

Implications for Student Affairs Personnel

The practical implications of our current findings and analyses are perhaps most clear in terms of efforts to assist college students in their selection of "appropriate" academic majors (i.e., environments). Past reliance on the psychological perspective in Holland's theory has led to encouraging students to select academic majors that are congruent with their dominant personality type so as to maximize the likelihood of their subsequent success in their chosen areas of study. In a sense, student choice is constrained by their existing personality profile at the time they enter college, and their choices are limited to those academic majors that are most likely to maximize their existing initially prominent characteristics. Our collective findings (see especially Feldman et al., 2001, 2004) supporting the sociological perspective of Holland's theory suggest that the advice provided students need not be constrained by students' past or present personality profile, but rather can be grounded in a more developmentally and futuristically oriented perspective based on the broad repertoire of competencies and interests that students desire to develop as a result of their collegiate experiences. This approach, which is much less restrictive and constraining, focuses the advice given students on what they hope to be rather than what they presently are.

Reardon and Bullock (2004) recently proposed a three-tiered "service-delivery model" to assist academic advisors and career counselors in their efforts to help students make informed choices among alternative academic majors and career choices based on this more developmentally and futuristically oriented utilization of Holland's theory. Their model is predicated on the following premise: "If students can use Holland's theoretical model to recognize, differentiate, and understand these diverse academic environments and the faculty members who dominate them, we believe they are more likely to find a place within the university where their satisfaction, involvement, and persistence will be increased" (p. 111). Reardon and Bullock use the four vignettes we developed (Smart et al., 2000, pp. 97-101) to summarize extant research findings on the distinctive competencies, interests, attitudes, and behaviors that faculty in Investigative, Artistic, Social, and Enterprising academic environments seek to reinforce and reward as the basis for their three-tiered "service delivery model." The vignettes serve as narrative descriptions of the alternative academic environments within Holland's theory and are used to assist students to make more informed choices among the environments based on their desired or preferred learning and career objectives. The information presented in each tier of the "self delivery model" and the amount and nature of direct involve-

ment by academic advisors and career counselors are based on the level of student "readiness for educational and career decision making": "self-help services" are suggested for students with high readiness; "brief staff-assisted services" are provided for students with moderate readiness; and "individual case-managed services" are most applicable for students with low readiness (pp. 118–119). The contribution of Reardon and Bullock illustrates how academic advisors and career counselors might use Holland's theory and the collective research based on the theory in a less restrictive and more developmentally and futuristically oriented manner than it has been used in the past to foster students' subsequent success in their college careers.

We concur with Reardon and Bullock (2004) that Holland's theory, and the findings from a limited number of studies about academic environments of the theory, has the potential to assist students in more readily recognizing, differentiating, and understanding the norms and values of the diverse academic environments that are so integral to what they subsequently learn and do not learn. We further share their belief that the vignettes we initially developed are illustrative of narrative descriptions of academic environments that could be used by academic advisors, career counselors, and others to assist students in making more informed choices regarding their ultimate selection of an academic major where they have the greatest likelihood of developing the repertoire of personal and occupational competencies, interests, attitudes, and behaviors they desire.

We would urge institutional and governmental officials to encourage and support the development, dissemination, and use of such descriptive materials (grounded in extant research findings) about alternative academic environments in colleges and universities to assist students in their selection of academic majors that are most analogous to their personal and professional goals and objectives. Such materials should be available to students at the time they begin their college careers. We further suggest that institutional and governmental officials initiate the necessary training and development programs for academic advisors, career counselors, faculty, and others who assist students in their selection of academic majors.

Holland's theory also has implications in terms of the development of institutional marketing and recruitment strategies. Cruickshank and Haan (2005), in noting the increasingly competitive environment of colleges and universities and the multiplicity of marketing strategies used by institutions in their efforts to recruit prospective students, suggest a variety of ways that Holland's theory might be used by admissions representatives and other institutional officials to better target and recruit students to their institutions. Their particular suggestions are based primarily on greater reliance on and more informed use of information routinely available to institutions using the ACT Assessment battery. Of particular interest within this comprehensive assessment battery is the information provided by the Student Profile and UNIACT sections (Prediger, 2002; Swaney, 1995). For example, the UNIACT section is comprised of 90 items that yield scores on six scales of 15 items each that correspond to each of the six Holland personality types.

Cruickshank and Haan (2005) have developed hypothetical case studies based upon data from the UNIACT and Student Profile sections of the ACT Assessment battery to illustrate how institutions can convey to prospective students the multi-

plicity of ways in which the programs and services of their institutions are related to predispositions of prospective students. A straightforward example is that institutions, having first determined their prospective students' personality profiles from the UNIACT portion of the ACT Assessment battery, can then tailor correspondence to those students that describes the academic majors and related co-curricular programs and activities at the institution in ways congruent with prospective students' expressed self-assessments of their interests, needs, and values at the time of college entry. In short, Cruickshank and Haan provide numerous examples of how Holland's theory can be applied in the recruitment process of colleges and universities by using information routinely available in the UNIACT and Student Profile sections of the ACT Assessment battery to help students determine the extent to which the programs and services offered by institutions match their own needs and interests.

We suggest that institutional and governmental officials initiate and support programs to train college and university admission personnel to use the routinely available information from various assessment batteries of students' characteristics (the ACT Assessment battery being only one example) in their communications with and advising of prospective students to assist them in selecting institutions. Such efforts have the potential to benefit both students and institutions by enhancing the likelihood of subsequent student stability, satisfaction, and success at the institution they ultimately decide to attend.

Implications for Assessing Student Outcomes

Assessing student learning outcomes is an integral component in establishing institutional effectiveness for purposes of accountability and accreditation purposes (Ewell, 2005; Napoli & Raymond, 2004). Our present and past analyses strongly suggest that academic environments (disciplines) should be a key element in institutional efforts to assess learning outcomes and that outcomes should be defined more broadly than just content knowledge since the academic environments seek to influence students' professional and personal self-perceptions, attitudes, interests, and values as well as their sheer acquisition of disciplinary content knowledge. Our knowledge and experience suggests, however, that this is not the common practice in typical institutional efforts to assess student outcomes. Seldom are the criteria used to assess student outcomes associated with the distinctive cognitive *and* affective outcomes that students' respective fields of study seek to reinforce and reward. Rather, the more typical practice is to develop a common or uniform set of criteria and to assess student learning across these multiple criteria, through either self-report or standardized measures, without regard to students' respective fields of study.

We believe that such current efforts to assess student outcomes have not taken sufficient heed of the consistent evidence based on Holland's theory that academic environments are a primary influence on what students do and do not learn, and that such practices may well have decided practical consequences in efforts to assess and

compare the educational performance of institutions, or the performance of academic departments within individual institutions. Simply and practically put, it is possible that comparisons of the performance of institutions across a diverse set of student learning outcomes may well be influenced to some extent by the proportional distribution of students in the respective institutions across major fields of study (i.e., academic environments) that seek to reinforce and reward the criteria chosen to assess student outcomes. For example, institutions with an uncommonly large proportion of students in Investigative fields of study might well be advantaged by the use of assessment criteria associated with student learning in terms of mathematical and scientific competencies or their acquisition of scholarly and scientific values and attitudes, while institutions with a large proportion of students in Enterprising fields of study could be advantaged in situations where assessment criteria focused on student learning in terms of interpersonal and leadership competencies or their acquisition of such traditional values and goals as economic and political achievement and high self-esteem. An analogous situation would exist *within* institutions in efforts to assess the performance of students in various academic programs (i.e., environments) on a common or uniform set of criteria for student outcomes. That is, programs that seek to reinforce and reward students for their growth in areas more commensurate with the learning outcomes assessed would be advantaged, while those that seek to reinforce and reward students in areas less commensurate with the learning outcomes assessed would be at a disadvantage.

We are thus led to reaffirm our conviction that academic environments must be an integral component in inter- and intra-institutional efforts to assess student outcomes. If academic environments are a primary influence on what students do and do not learn, then their omission from such critical efforts to establish institutional (and departmental) effectiveness for accountability and accreditation purposes seriously compromises the validity and integrity of such efforts. It seems to us, then, that the common practices inherent in contemporary institutional level efforts to assess student outcomes have limits in yielding meaningful assessment results given that they largely ignore variability in student success or performance measures associated with their chosen academic environments. We would urge institutional and governmental officials to focus such assessment efforts at the sub-environment (i.e., academic environment) level, and that the choices of assessment criteria and interpretation of student performance be based on students' academic majors.

Implications for Faculty Understanding of Student Success

Our findings supporting the socialization assumption of Holland's theory clearly show that the diverse academic environments are equally successful in their efforts to assist students whose personality types are congruent and incongruent with the environment to acquire the unique repertoire of interests, abilities, and values that the respective environments seek to reinforce and reward. This is most vividly shown in

the parallel (though not identical) lines reflecting the magnitude of growth of congruent and incongruent students in the distinctive repertoire of interests, abilities, and values that Investigative, Artistic, Social, and Enterprising environments seek to reinforce and reward (see especially Figs. 1–5 in Feldman et al., 2001). While the patterns of growth by congruent and incongruent students in each of the four academic environments are remarkably equivalent in terms of parallel changes, in all instances incongruent students (who do “learn” as much as their congruent peers over a four year period) begin and end their college careers with lower scores on the respective sets of interests, abilities, and values that each of the four academic environments seek to reinforce and reward. Are these students then less “successful”? We think not. In short, what faculty members and academic leaders must understand is that student performance, and ultimate success, should be judged in relation to students’ possession of the interests, abilities, and values that the respective academic environments seek to reinforce and reward at the time they enter the program.

In sum, student success is a matter of “learning,” growth,” or “value added” rather than simple performance in terms of test scores and grades. Holland’s theory and the information routinely available to colleges and universities—say through the UNIACT and Student Profile sections of the ACT Assessment battery as examples—can be useful to faculty members and academic leaders in their efforts to assess student success in their courses and programs. Once again, we would encourage institutional and governmental officials to initiate and support programs to assist faculty members and academic leaders in the use of Holland’s theory and the information available from commonly used assessment batteries in their efforts to understand and assess student success in their academic programs.

Comparing Holland’s Theory with Other Contemporary Efforts to Understand Student Success

Some Characteristics of Contemporary Efforts to Understand Student Success

Pascarella and Terenzini (2005) have identified two broad categories of theories or models that have guided most research on how college students grow or change as a consequence of their collegiate experiences (cf. Feldman, 1972). They label the first cluster as “developmental” theories or models (e.g., psychological “stage” theories), which focus primarily on *intra*-individual change or growth that “typically describe one or more of the dimensions of student development and the stages, phases, or other movement along a given dimension” (p. 18). They label the second family as “college impact” models, which focus primarily on inter-individual origins of student change “associated with the characteristics of the institutions students attend (between-college effects) and/or with the experiences students have while enrolled (within-college effects)” (p. 18). They further note that “the primary

difference between the two families of theories lies in the relative degree of attention they give to *what* changes in college students versus *how* these changes come about. Whereas student-centered developmental models concentrate on the nature or content of student change (for example, identity formation, moral or cognitive development), 'college impact' models focus on the sources of change (such as differential institutional characteristics, programs and services, student experiences, and interactions with students and faculty members)" (p. 19).

Our own intellectual interests have decidedly more in common with the "college impact" models as described by Pascarella and Terenzini (2005) since we are interested in *how* students change but even more so in the extent to which such changes are related to attributes of the institutions students attend and with the experiences students have while enrolled in those institutions. Certain concerns we have with the extant research literature that focuses on student success are derived primarily, though not exclusively, from that sector of the research literature that is based on "college impact" models as described by Pascarella and Terenzini.

In considering contemporary efforts to understand student success in American higher education, we believe that they may well have only moderate success for three primary reasons. First, current conceptual models tend to be either overly broad or insufficiently developed theoretically. Without sufficient reliance on systematic and full-fledged theory, scholars have been left to an empirical search for predictors of student success, however defined. Second, contemporary efforts to understand the factors contributing to student success have focused predominantly on the characteristics and behaviors of college students. Pascarella and Terenzini (1991, 2005) have noted this tendency in their discussion of the growing dominance of the psychological research paradigm in the higher education research literature. Third, while the prevailing focus on student characteristics and behaviors is wholly appropriate, the growing dominance of the psychological research paradigm has resulted in a major reduction in attention to the socialization influences of institutions and campus environments. We have witnessed a decline in the past two decades in the research of how, and to what extent, the collective attitudes and behaviors of faculty and administrators and the environments of colleges and universities are seen as contributing to student success. These three characteristics of the contemporary higher education research literature have important implications for the conduct of research on student success. The following discusses each of these concerns in more depth.

Theoretical (and Concomitant Measurement) Limitations

Pascarella and Terenzini (2005) discuss five "college impact" models: Astin's I-E-O Model (1970a, b) and his Theory of Involvement (1984), Tinto's (1975, 1993) Theory of Student Departure, Pascarella's (1985) Model of Learning and Cognitive Development, and Weidman's (1989) Model of Undergraduate Socialization. Pascarella and Terenzini's observations about these five models clearly illustrate that they are highly general in character. They tend to be broad conceptual models that are grounded in and derived from the current traditions and practices of scholars who have studied

the personal and institutional factors associated with the persistence, satisfaction, and achievement of college students. As Pascarella and Terenzini (2005) put it, the “models are less specific than theories of individual development in their explication of the particular changes students undergo, less detailed in their overall exposition, and less explicit about their grounding in the work of other theorists” (p. 84).

Although valuable in terms of bringing some order to, and making some sense of, the multitude of factors that have been found to be related to various dimensions of student success, these models and others like them do not completely satisfy the fundamental criteria of theories provided by Kerlinger (1986) and others. Moreover, even the two most analytically advanced models, Tinto’s Theory of Student Departure and Weidman’s Model of Undergraduate Socialization, lack psychometrically validated measures of any constructs in the respective models, nor are there psychometrically validated measures for the constructs imbedded in the three other “college impact” models. Thus, the large bulk of research on student success based upon these “college impact” models has not been grounded in full-fledged theory, and this less than desirable condition has been compounded by an absence of psychometrically sound measures for the constructs imbedded in them. These theoretical and methodological limitations may be important contributing factors in explaining why literature reviews of empirical studies grounded in such models report weak support for the hypothesized effects of the models’ constructs (see, for example, Braxton et al., 1997)

Dominant Attention on Student Characteristics and Behaviors

The absence of full theoretical grounding and the presence of measurement deficiencies of college impact studies may also have helped encourage an empirical search for factors consistently associated with student success. The difficulties inherent in this essentially atheoretical mindset have been compounded by the dominance of the psychological research paradigm noted by Pascarella and Terenzini (1991, 2005). One consequence of the confluence of these two forces has been that primary attention has been devoted to the characteristics and behaviors of college students. This tendency is manifested in a number of the leading student-centered research traditions that have guided inquiry on the factors contributing to student success. Illustrative of these traditions are Astin’s (1984) focus on student involvement, Tinto’s (1975, 1993) emphasis on student integration, Pace’s (1984, 1990a) attention to the quality of student effort, and the more recent and rapidly growing efforts of Kuh (2001) and his colleagues regarding student engagement. While these research traditions may use different terminology to describe their respective concepts of student behaviors, their views are based on the central premise that students learn from what they do in college (Pike et al., 2006). Considerable evidence has emerged in recent years supporting this central premise of the student-centered research traditions (see, for example, Gellin, 2003; Kuh et al., 2000; Pike, 1999; Pike & Kuh, 2005; Pike et al., 2003).

The emphasis on student characteristics and behaviors has been linked to the development of “process indicators” and measures of student behaviors that have been found to be related to desired student outcomes (e.g., learning) following the recommendation of the National Center for Education Statistics (NCES, 1991). Process indicators are frequently referred to as “principles of good practice” or “best practices in undergraduate education” and “are assumed to be equally appropriate, or can be adapted to produce comparable outcomes, for *all* students across *all* types of institutional settings” (Kuh et al., 1997, p. 436, emphasis added).

The accumulative findings of evidence grounded in the student-centered research traditions, in conjunction with growing interest in the development of process indicators, has led numerous scholars to suggest a uniform set of “best practices” or “institutional benchmarks” that represent the salient student behaviors and perceptions that have been found to have a consistent, positive association with multiple manifestations of student success (e.g., persistence, satisfaction, learning). Examples of these “best practices” include the National Benchmarks of Effective Educational Practice developed at the Indiana University Center for Postsecondary Research (IUCPR, 2001). The five national benchmarks are: Level of Academic Challenge (e.g., time spent preparing for class, emphasis on higher-order thinking in class); Active and Collaborative Learning (e.g., frequency of interaction with other students in and out of class); Student Interaction with Faculty Members (e.g., frequency of interactions with faculty members in and out of class); Enriching Educational Experiences (e.g., frequency of interactions with diverse student groups, use of electronic technology, and participation in internship and study abroad activities); and Supportive Campus Environment (e.g., students’ perceptions of the quality of their relationships with faculty, peers, and administrative personnel).

In an earlier analysis, we raised the possibility that “what scholars find in their inquiries may be influenced by what they look for” (Smart et al., 2000, p. 238), and we believe that the growing dominance of the psychological research paradigm noted by Pascarella and Terenzini (1991, 2005) and the concomitant emergence of student-centered research traditions have given primary attention to student characteristics and especially their behaviors in the quest to determine the primary factors associated with student success. And, indeed, a growing body of evidence does support the importance of student characteristics and behaviors to their ultimate success in postsecondary education. What we find discomfiting is the noticeable decline in attention devoted to the influences of campus environments and other manifestations of the collective efforts of faculty and administrative personnel to student success. To be sure, each of the student-centered research traditions manifested in the works of Astin, Tinto, Pace, and Kuh do consider both college students and college environments. However, an inspection of the proportion of attention devoted to each of these elements and the respective intellectual and methodological rigor manifested in the respective components leads to the conclusion that the component of the campus environment is of a more distant or secondary interest in the conceptual and methodological aspects of these student-centered research traditions and the many studies grounded in them. Lack of sufficient attention to environments may well result in an *overestimation* of the importance of

student attributes and behaviors. This circumstance is an example of the classic “third variable” problem wherein the estimates of the effects of measured variables contain the influence of omitted variables, thus appearing to enhance the importance of those included variables.

Insufficient Attention to Campus Environments

We share with the student-centered research traditions a fundamental belief that basic understanding of student success requires attention to both the predispositions and behaviors of college students *and* the nature of campus environments. We believe, however, that the attention devoted to the college environment component should be at least equivalent to that devoted to the college student component. We are reminded of both the rich intellectual heritage of college environments in the higher education research literature throughout the 1960s, 1970s, and 1980s and the pervasive effects of college environments on the change and stability of college students documented by Feldman and Newcomb (1969) and Baird (1988).

Focused attention on the study of college environments and their relationship to the change and stability of college students was a primary concern of higher education scholars beginning with the pioneering work of Pace and Stern (1958). Intellectual and conceptual interest in college environments was complemented by the development of intellectually sophisticated and methodologically sound measurement instruments to aid scholars in their quest to learn how college environments contributed to students’ adjustment to and success in their collegiate endeavors. Instruments such as the College Characteristics Index (CCI; Stern, 1970), College and University Environment Scales (CUES; Pace, 1969), Institutional Functioning Inventory (IFI; Peterson et al., 1970), and Institutional Goal Inventory (IGI; Peterson & Uhl, 1977) measured multiple components of campus environments and were central to fostering the study of college environments.

There appears to be a general consensus that the nature of campus environments and sub-environments is related to patterns of student growth and development, though the consistency and magnitude of the relationships varies across studies (Feldman & Newcomb, 1969; Baird, 1988). For example, in their review of the research on the impact of college on students, Feldman and Newcomb primarily framed their analysis in terms of the overall institutional environment (e.g., types of colleges) as well as the more specific subenvironments within colleges (e.g., major fields and residential groupings). In addition to reviewing many specific studies showing the distinctive impacts of various specific college environments and subenvironments, the authors made a case for a more general environmental impact in terms of the accentuation of initial group differences. At the institutional (college) level, they write: “What we discovered to be most usual, in the studies we have surveyed, is that diversities among entering student bodies [across different college and universities] are, if anything, amplified during the college years ...”

(p. 141). As an example at the subenvironmental level, they reported the following as a generalization that could be made across studies of major-field effects:

The evidence is clear ... that differential experiences in the several major fields do have impacts beyond those attributable to initial selection into those fields. Perhaps the most convincing evidence of this is the prevalence of the accentuation of initial major-field differences. It has been shown that preexisting differences in characteristics typical of students initially choosing different curricular tend to become more pronounced following experience in terms of those major fields (p. 193).

Accentuation of initial group differences, as one kind of environmental impact, has received conceptual refinement and additional empirical support since Feldman and Newcomb (1969) originally called attention to the phenomenon (see, for example, Feldman & Weiler, 1976; Smart & Feldman, 1998). For instance, Feldman and Weiler (explored whether preexisting differences in characteristics of University of Michigan students initially selecting different college majors tended to become more pronounced (or accentuated) following their experiences in those major fields. The researchers found accentuation of initial group differences for female students on the Complexity and Religious Liberalism scales of the Omnibus Personality Inventory. Estheticism scores for female students and Theoretical Orientation scores for male students also showed accentuation of initial group differences (although the findings were a little less clear in these two cases).

Much of the richness of this earlier genre of scholarship on college environments has been lost in the past two or three decades with the emerging dominance of the psychological research paradigm noted by Pascarella and Terenzini (1991, 2005) and the concomitant development of student-centered research traditions. We regard this as a problematic development if, as all seem to agree, knowledge of the likelihood of student persistence, satisfaction, and success (e.g., learning) requires knowledge of both students' predispositions and behaviors and of campus environments. There are, however, some studies devoted to the study of college and university environments. The work of Berger and Milem (2000), Hurtado et al. (2003), and Baird (2005) are illustrative of the limited number of contemporary efforts that demonstrate the importance of analyzing college and university environments to understand student success.

Potential Benefits from Reliance on Holland's Theory

We believe that the collective attributes of Holland's theory would enhance contemporary efforts to understand student success in a variety of ways. What follows are our perceptions of some of the benefits that would accrue from reliance on Holland's theory in efforts to understand student success in postsecondary education. We do not offer Holland's theory as a panacea for what we believe to be certain weaknesses and deficiencies of current traditions that guide much research on student success, but rather seek to show the advantages of a theory-based approach that has direct applicability to the investigation of student success.

Guidance from Holland's Theory as a Theory of the Educational and Vocational Success of Individuals in Organizational Settings

A major limitation to the success of current attempts to understand and promote student success is that many of them use conceptual models that are either overly broad or insufficiently developed theoretically. We wish to emphasize here the direct appropriateness of Holland's theory as a full-fledged theory of the educational and vocational success of individuals in organizational settings. While Holland initially proposed his theory of careers to assist individuals in their selection of occupations where they have the greatest likelihood of vocational success, he has repeatedly noted that "the hypotheses about educational behaviors ... resemble those for vocational behavior. The choice of, stability in, satisfaction with, and achievement in a field of training or study follow rules *identical* to those outlined for vocational behavior" (Holland, 1997, p. 71, emphasis added). Holland's theory is thus a theory that focuses specifically on salient components of most any definition of the vocational or educational success of individuals in organizational settings (see, for example, Kuh et al., 2005).

Given the direct applicability of Holland's theory to student success in postsecondary education and our own perspective of the need for greater reliance on full-fledged theories in efforts to understand and promote student success, the rather limited reliance to date on Holland's theory to guide this line of inquiry remains something of a mystery. We believe that reliance on Holland's theory, or any other full-fledged appropriate theory, would provide coherence and continuity among studies that would advance the evolution of systematic knowledge about the phenomenon under consideration.

Holland's theory need not be used to the exclusion of other theories or models that have guided research on student success in postsecondary education. Indeed one useful approach would be to incorporate constructs in Holland's theory (e.g., students' personality types, academic environments created primarily by faculty members) into less fully developed theories and models grounded in the premise that student success in postsecondary education is a function of both the efforts of students and the programs, policies, and services of institutions they attend (e.g., Astin, 1984, 1996; Chickering & Gamson, 1987; Pace, 1984, 1990b; Tinto, 1975, 1993). Holland's theory of person-environment fit and its hexagonal model (see Fig. 1) provide an excellent theory-based mechanism by which to assess the extent to which students become integrated into the academic and social systems of their institutions (Tinto, 1975, 1993), the degree of students' physical and psychological involvement in their collegiate experiences (Astin, 1984, 1996), and the quality of student effort at their institutions (Pace, 1984, 1990b). As an example, a recent series of studies by Jeff Milem and Paul Umbach illustrates how salient constructs from Holland's theory may be incorporated into broader research designs to promote understanding of student success in terms of important and commonly investigated student outcomes (see Milem & Hakuta, 2000; Milem & Umbach, 2003; Milem et al., 2004; Umbach & Milem, 2004).

Balanced Attention to Both Psychological and Sociological Components of Student Success Provided in Holland's Theory

Holland's theory places equal emphasis on both psychological and sociological considerations in efforts to understand student success in postsecondary education, whether that success is defined in terms of either a balanced or a peaked profile of change as a result of their educational endeavors. This aspect of the theory addresses our concern about the imbalance that exists in contemporary efforts where attention to psychological considerations (e.g., student predispositions and behaviors) surpasses attention to sociological considerations (e.g., academic environments). As a theory of person-environments fit, equal attention is devoted to the attributes of individuals and to the fundamental nature of their academic environments in understanding their subsequent levels of educational stability, satisfaction, or achievement.

While Holland's theory gives equal attention to the influences of individuals and their environments in understanding student success, perhaps the most unique and important contribution of our own collective efforts over the past decade and the findings we have given in this chapter is the consistent and uniform influence of academic environments on the success of similar (congruent) and dissimilar (incongruent) students in those environments. These findings are distinctive in that they run counter to the prevailing knowledge that has evolved from over three decades of research on the factors that are most critical in explaining how colleges affect students. For example, Pascarella and Terenzini (2005) concluded that "One of the most unequivocal conclusions drawn from both our previous synthesis and the research during the 1990s is that the impact of college is largely determined by *individual effort and involvement* in the academic, interpersonal, and extracurricular offerings on a campus" (p. 602, emphasis added). As we noted earlier, "what scholars find in their inquiries may be influenced by what they look for" (Smart et al., 2000, p. 238), and the consensus of evidence that has evolved regarding the dominant importance of student integration, involvement, and effort may well be a function of the dominant reliance on the use of student-centered models and traditions that have guided most inquiries over the past three decades. This possibility emphasizes the need for theories and conceptual models, like Holland's theory, that contain both psychological and sociological components.

The importance of our current findings (see also Feldman et al., 2004), based on a theory that has both psychological (individuals) and sociological (environments) components, is that the influence of academic environments appears greater than the effects of the individual's own predispositions. This conclusion suggests that efforts to determine the factors contributing to student success in postsecondary education should be guided by theories or conceptual models that take into consideration both the predispositions and behaviors of students and the norms, values, and expectations that their environments seek to reinforce and reward. The dominant reliance on student-centered research paradigms that has

guided scholarly efforts over the past three decades may well have contributed to an overestimation of the importance of student predispositions and behaviors. Similarly, reliance on research paradigms that stress the centrality only of environmental attributes would likely result in an overestimation of environmental influences. Balance between individual and environmental components is the key to assessing the relative importance of individual predisposition or behaviors and environmental reinforcement or reward patterns on student success, and such balance is evident in Holland's theory. We believe the incorporation of key constructs of Holland's theory into existing student-centered research paradigms would help alleviate the current imbalance.

Specificity of (and Psychometrically Sound Measures of) Incorporated Constructs in Holland's Theory

Holland's theory and subsequent efforts by Holland and his colleagues provide a balance between individual and environmental considerations by incorporating individual and environmental constructs in the theory, providing a mechanism in the theory to ascertain the relationships between the constructs, and through the development of psychometrically sound instruments to measure relevant individual and environmental attributes. The theory provides specific theoretical attention to the salient attributes of individuals, their environments, and the fit or congruence between individuals and environments. As described earlier, the theory assumes that individuals may be classified in terms of their similarity to six personality types, proposes six analogous work or academic environments, and offers a hexagonal model, shown in Fig. 1, to assess the level of fit or congruence between individuals and their environments (the congruence component). In addition, Holland and his associates have developed psychometrically sound instruments for the measurement of individuals' personality types (e.g., *Self-Directed Search*, Holland et al., 1994) and the analogous model environments (e.g., *Position Classification Inventory*, Gottfredson & Holland, 1991). Finally, theory-based procedures have been developed to determine the level of fit or congruence between individuals and their environments (see, for example, Brown & Gore, 1994).

These attributes of Holland's theory have important implications for subsequent inquiry on student success in that they provide scholars with guidance in terms of theory-based constructs to be used in their inquiries, theory-based hypothesized relationships among the constructs, and psychometrically sound measures of those constructs. We believe that the use of the individual and environmental constructs in Holland's theory and the associated measurement instruments would represent a major theoretical and measurement advancement in scholarship on student success in postsecondary education. Such theoretical and measurement sophistication would help counter the more atheoretical empirical search for factors associated with student success.

Concluding Observations

The findings and analyses presented in this chapter provide support for both the traditional definition and an alternative definition of student success derived from Holland's theory. Support for the traditional definition, based on the *congruence* assumption of Holland's theory, is shown by the likelihood of students further developing their initially prominent characteristics is basically contingent on their selection of a congruent rather than an incongruent academic environment. Support for an alternative definition of student success, based on the *socialization* assumption of Holland's theory, comes from the clear evidence of a consistent pattern of student growth in the distinctive set of abilities and interests that are required, reinforced and rewarded by each of the four academic environments we examined irrespective of the students' dominant personality type. For each of the four personality types we examined, any appreciable growth in the four sets of abilities and interests is, for the most part, dependent on the academic environments of their major field of study (whereas students tend to remain stable or decline in the three other sets of abilities and interests that are not reinforced or rewarded by the academic environment of their major field of study).

Our findings and analyses, then, provide strong support for the socialization assumption of Holland's theory and point to the absolute centrality of academic environments as a primary influence on longitudinal change and stability in patterns of college student success across a broad repertoire of ability, interests and values associated with college student outcome measures. In fact, the findings suggest a stronger socialization than psychological dynamic at work in Holland's theory given the consistent and pervasive effects of academic environments on *both* congruent and incongruent students. Given these results, we offered several practical and policy implications—by focusing on what we perceive to be the merits that would accrue from greater reliance on Holland's theory by faculty members, campus leaders, and governmental officials in their efforts to understand, assess and promote student success.

In addition, we believe the use of Holland's theory would enhance contemporary efforts to understand student success in a variety of ways. Holland's theory has great applicability to the investigation of student success because it (1) primarily focuses on crucial components in any generic definition of student success, (2) provides a basis for the consideration of both individuals and their environments since both have been shown to be essential in successful efforts to understand student success, (3) provides a basis for the selection of theory-based constructs to guide inquiry on student success and accepted measurement instruments for those constructs, and (4) provides guidance for the use of appropriate analytic procedures to reveal more precise estimates of student-success measures. In sum, reliance on Holland's theory would provide a theoretical linkage between variations in patterns of student success and students' learning experiences as well as their interactions with different academic environments.

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